Better EVMS Implementation

Themes and Recommendations

Joint Space Cost Council (JSCC)

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April 15, 2015

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Preface

The Joint Space Cost Council (JSCC) was established in 2008 by the Undersecretary of Defense for Acquisition, Technology, and Logistics Support, on the recommendation of the Aerospace Industries Association to improve collaboration with oversight and service/agency levels. The JSCC maintains a focus on cost credibility and realism in estimates, budgets, schedules, data, proposals and program execution. The JSCC fosters broad participation across Industry and Government. JSCC initiatives are consistent with Government and Industry focus on Affordability.

This report documents a JSCC study used to investigate the cost premium of additional Government requirements associated with EVM. This study used a survey of Industry to identify impacts generated by the federal Government on the use of EVM and incorporated those results into analysis, themes, and recommendations. Although the survey results and analysis were reviewed collaboratively by Government and Industry participants, not all opinions, issues and recommendations are necessarily endorsed or supported by all Government stakeholders.

The themes and recommendations herein provide actionable direction based on data collected and analyzed during the JSCC Better Earned Value Management (EVM) Implementation Study. Major stakeholders, including numerous Industry executives as well as Government representatives from the Space community, PARCA, and DCMA have contributed to or reviewed this document and were involved throughout the survey process. The results are being provided to a wider group of Government and Industry stakeholders as a basis for initiating change to improve efficiency and identify opportunities to reduce program costs.

The completion of the JSCC Better EVM Implementation Recommendations Report represents the transition from Phase 1 (Industry Cost Drivers of the Customer cost premium) to Phase 2 (Government value derived from the Customer cost premium) of the JSCC Better EVM Implementation Study. While Phase 1 focused primarily on three key initiatives as a result of the analysis, the study results contain an extensive repository of data for further research which will provide additional opportunities in the future to improve EVM implementation. In Phase 2, the JSCC will further research the Government value derived from Industry's reported cost. A second JSCC report will analyze the benefits from the cost premium of Customer reporting requirements and other management practices Industry initially identified as cost drivers. The second report will provide recommendations for high cost and low value requirements that may be identified for future cost reductions. Likewise, the Phase 2 study results and report will identify high value reports and management practices indicating the cost premium has been substantiated.

1. Introduction

In an environment when the Government is striving to maximize values of taxpayer investment to achieve mission objectives, federal programs must become more cost efficient and affordable. In Government and Industry, senior leadership in the Space community, Program Managers, and other stakeholders have questioned the costs and/or burdens related to the implementation, sustainment, and reliability of a suppliers' Earned Value Management System (EVMS) when executing a Government contract.

Relying on the premise that EVM is recognized worldwide as a valued fundamental practice most ***contractors already have a management system in place capable of supporting major Government Customer acquisitions***[1] *and that* ***EVM is a best management practice for Government Customer contracts***, the Joint Space Cost Council sponsored a study in April 2013 to assess Industry's concerns of excessive costs typically incurred on federal Government[2] cost type contracts in the Space community. These concerns generally relate to the cost premium containing Customer reporting requirements and specific management practices. The primary intent of the study was to:

1) Understand any real or perceived impact on program cost specifically associated with EVM requirements on major Government development programs that are above and beyond those used on commercial efforts
2) Review and analyze any significant delta implementation impacts; and,
3) Provide feedback and recommendations to Government and Industry stakeholders in the spirit of the Better Buying Power initiative.

A key assumption of this study is that *Industry already strives to optimize the implementation of EVMS on commercial efforts (programs without the Government requirements).* Therefore, the scope of the project was limited to the identification of **delta implementation costs of EVM requirements applied on Government contracts compared with how a company implements EVMS on Commercial, Internal or Fixed Price Programs** (*Figure 1*).

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[1] *This report does not address the initial investment required for a company to design and implement a validated EVMS,*

[2] *There may be some limited instances in which the term "Government" in this report applies to either a Government program office and/or prime contractors who may be the Customer of a major subcontract requiring the flow-down of EVMS provisions and clauses and reporting requirements.*

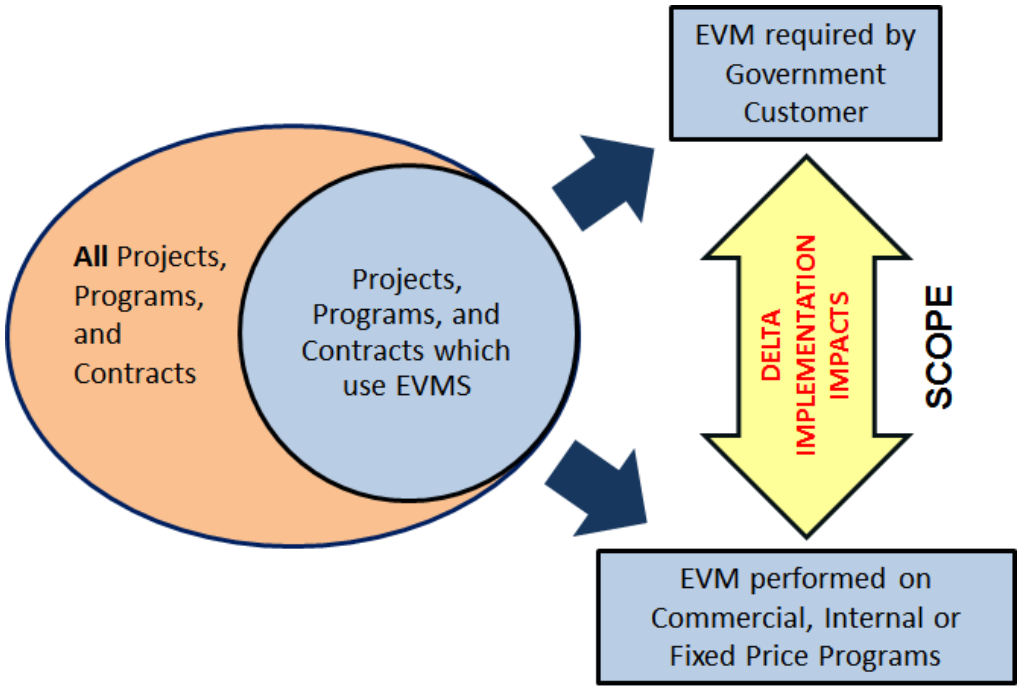

Figure 1 – Scope of JSCC Study

The initial concept of the JSCC Study was to identify additional costs (dollar amount) for EVM that are attributable to Government programs. However, EVM is thoroughly integrated with program management, so EVM-specific costs have been difficult to segregate and Industry has not been able to provide this data. Although the study does not provide a dollar amount or percentage of contract costs attributable to EVM, contractors were able to identify qualitative impacts (*High*, *Medium*, *Low*, or *No Impact*) using a survey designed to support the JSCC study. Based on Industry's qualitative responses, the JSCC evaluated the non-dollarized survey impact statements both qualitatively and quantitatively for trends and analysis supporting final recommendations.

The JSCC Study Team preliminarily met with several Government program offices to explore discussions of the Government value derived from Government reporting requirements and management practices which Industry identified as Cost Drivers. The JSCC plans to follow up with a second phase of this study to further collect and assess additional Government stakeholder inputs and to assess the cost/benefit of the Government cost premium identified in the survey.

1.1 Survey Synopsis

The JSCC hosted an industry day, which provided contractors with the opportunity to identify all issues and concerns associated with EVM requirements on Government cost type contracts. A study team used this input to develop a survey instrument containing 78 Cost Areas grouped into 15 Cost Drivers (see *Appendix B* for a Complete Breakout of JSCC Cost Areas and Cost Drivers). The survey asked each respondent to

provide comments to support any Cost Area identified as a *Medium* or *High* impact and to identify the responsible stakeholder. Once finalized, the survey was distributed to five major contractors (Ball Aerospace, Boeing, Lockheed Martin, Northrup Grumman, and Raytheon) who then passed it on to 50 programs[3] with dollar values ranging from tens of millions to multiple billions (see *Appendix C*, *Figure 32*).

Once the survey was completed, the JSCC Study Team engaged with stakeholders identified in the survey to share preliminary results, gathered with EVM experts to analyze those results, and developed recommendations. In its raw state, the survey results contain 1,223 comments and over 3,500 impact ratings spread across 78 separate Cost Areas within 15 Cost Drivers. This data was originally organized to capture the drivers identified as potential problematic areas identified by the JSCC. This initial analysis of survey responses and comments created an opportunity to identify fact-driven data that support or refute decades of biases and anecdotal assertions of EVM Cost Drivers that were raised in the initial stages of the study (e.g., the cost of IBR's, EVM reporting requirements, tracking MR by CLIN, IMS delivery, etc.).

The significant amount of survey data collected, coupled with the number of comments, created an opportunity to perform cross-cutting analysis of closely inter-related Cost Areas and identify trends and new information. To perform the cross-cutting analysis an EVM Expert Working Group of subject matter experts representing both Industry and the Government (see Appendix E) performed a Cost Area re-grouping exercise which resulted in a series of candidate themes. The purpose of a theme was to develop consensus of expert opinion representing cross-cutting analysis of survey comments which were not limited and restricted to the initial categories of the survey Cost Drivers and Cost Areas. As a result of the JSCC's analysis and recommendations, both Government and Industry stakeholders have suggested actions for better EVM implementation. *Figure 2* provides a complete timeline of the Better EVM Implementation study from December 2012 through December 2014.

[3] *Due to anomalous data, only 46 of the 50 surveys could be used. Three responses were generated by Government personnel and could not be used to identify impacts identified by Industry. One additional survey response did not identify any impacts nor did it provide any comments.*

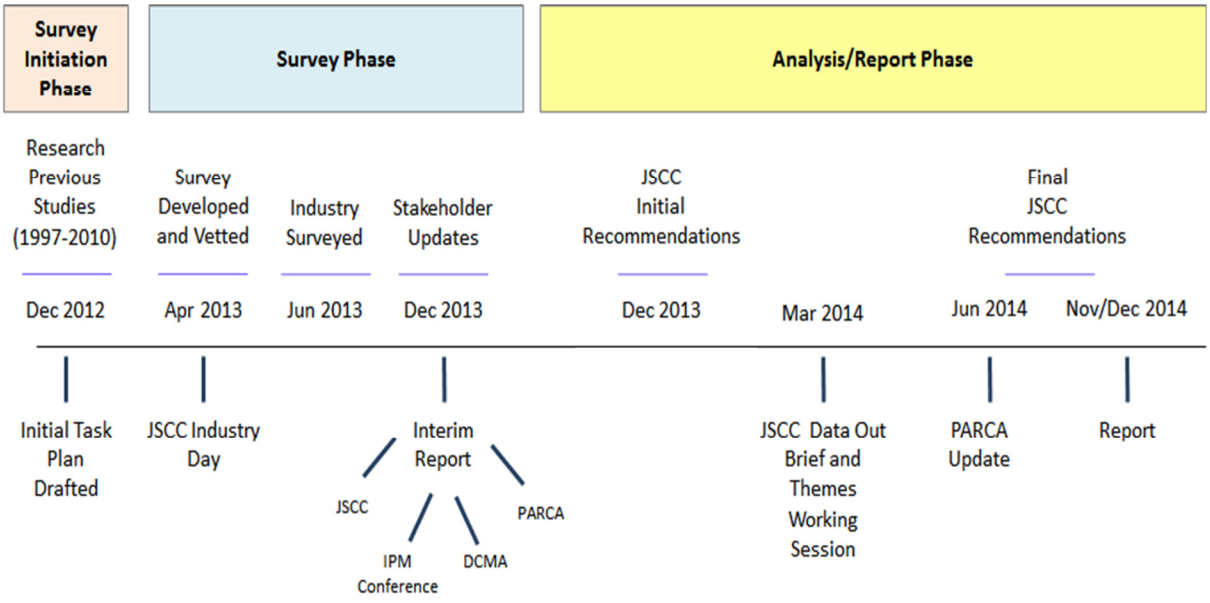

Figure 2 – JSCC Study Timeline

1.2 JSCC Recommendations

As described in *Section 2*, *Survey Analysis – Themes and Recommendations*, there is qualitative cost impact data with accompanying comments to support improvements for many stakeholders. In addition to generating themes and recommendations, the JSCC Study Team also reviewed and verified the list of suggested implementing guidance and references that stakeholders could use as a starting point for leveraging study results (see *Appendix A – Suggested Implementing Guidance/References*).

2. Survey Analysis – Themes and Recommendations

The JSCC study appears to indicate that the delta implementation cost of EVM on Government Contracts is minimal. 73% of all survey data points (2,644 of the 3,588 answers) were categorized as *Low Impact* or *No Impact* for cost premium identified to comply with Government EVM requirements (45% were *No Impact* and 28% were *Low Impact* – see *Figure 3*). The remaining 27% of survey data points were recognized as *High Impact* or *Medium Impact* (13% were *High Impact* and 14% were *Medium Impact*).

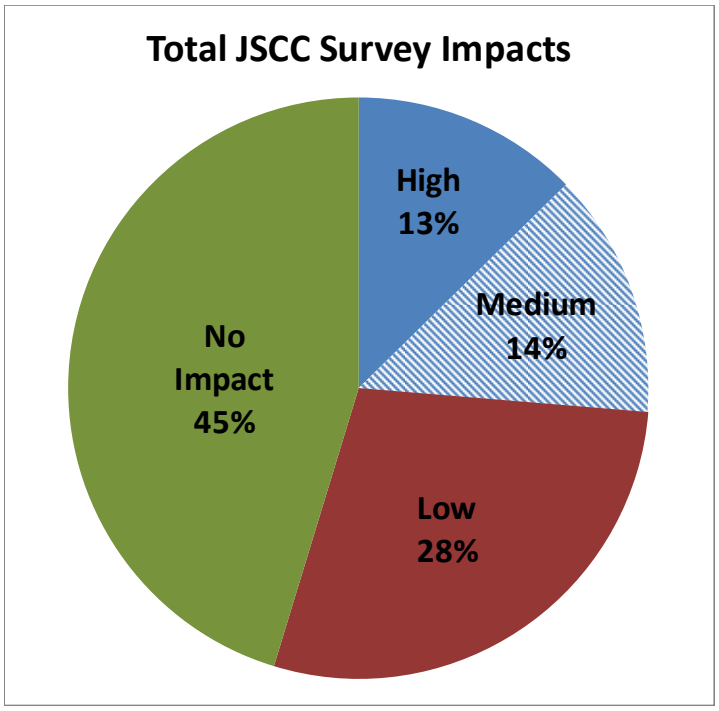

Figure 3 – JSCC Survey Impacts

It is interesting to note that there is not a single Cost Area identified in the survey results that has a *High* and/or *Medium impact* in more than 50% of the programs surveyed (*Figure 4*).

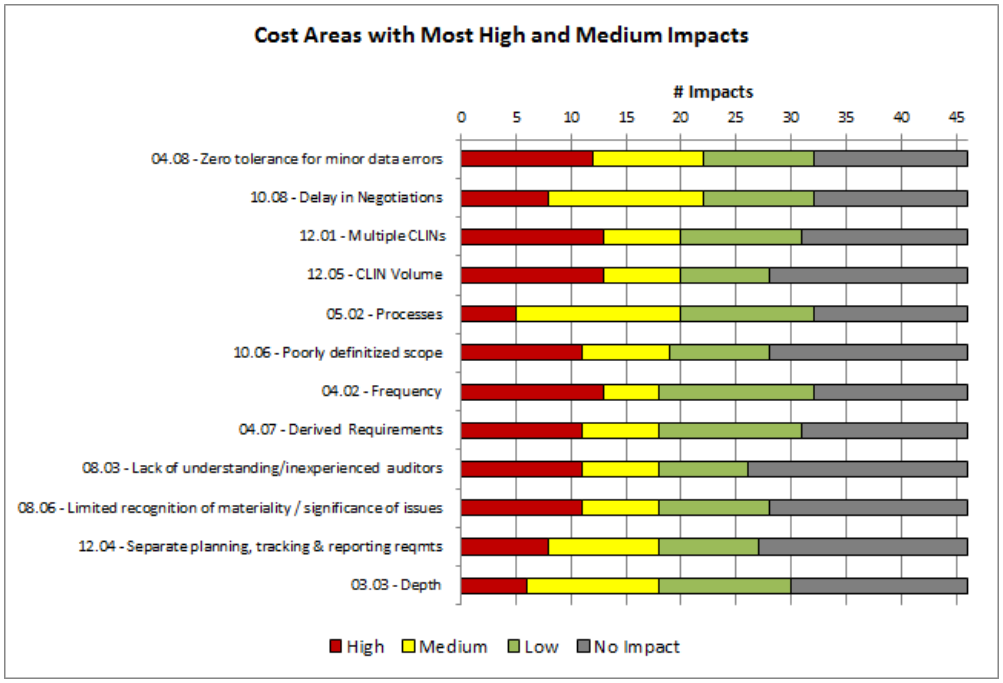

Figure 4 – Cost Areas with Most High and Medium Impacts

Moreover, in some cases, Cost Areas that were identified during the JSCC survey development stage as potential areas of significant impact were not validated with large numbers of *High* and *Medium Impacts* (*Figure 5*).

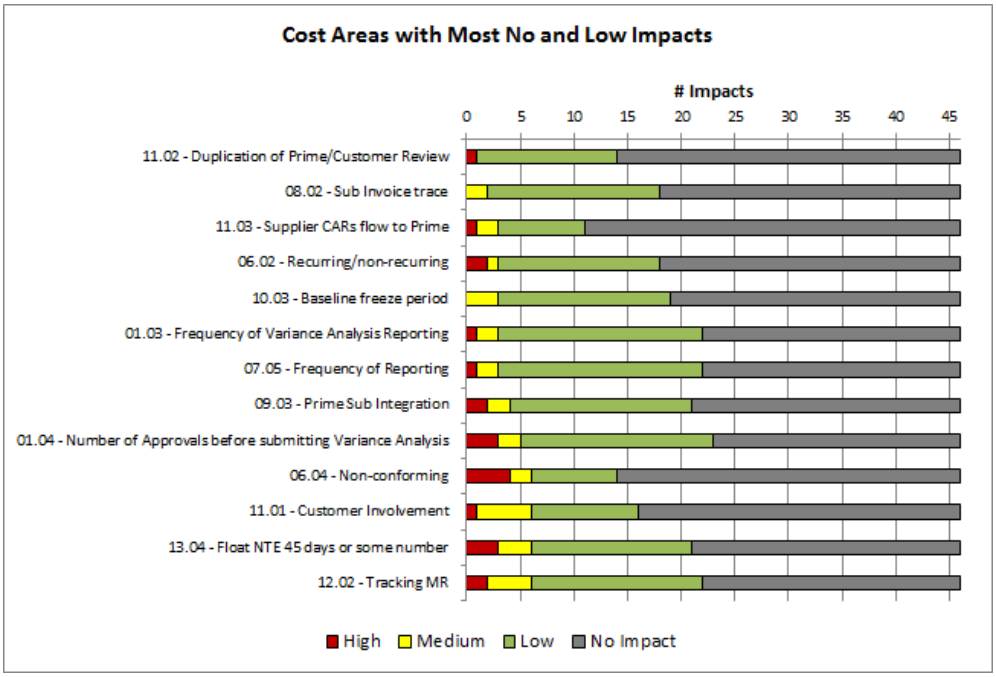

Figure 5 – Cost Areas with Most Low and No Impacts

Overall, the JSCC Survey results appear to be in-line with previous studies showing a marginal Government cost premium associated with EVM[4]. Coopers Lybrand[5] identified this cost at less than one percent. Even so, the survey results did identify several areas that can be addressed to create a more efficient implementation of EVM.

It is important to note that Government Program Management was identified in the survey as the Primary Stakeholder for 40% of all *High* and *Medium Impacts* (*Figure 6*) and was identified as the most significant

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[4] *The first step in initiating this study was a review of 17 similar studies and academic research papers dating from 1977 through 2010. Many previous studies have attempted to address the cost of EVM and some have estimated the cost of using EVM. These studies largely found the cost of EVM to be marginal, difficult to estimate, and/or not significant enough to stand on its own as a significant cost driver to program management. The JSCC study focuses on evaluating Industry's claims of costly and non-value added Customer reporting requirements and management practices on cost type contracts in order to identify opportunities for Better EVM Implementation.*

[5] *Coopers Lybrand performed an activity based costing approach of C/SCSC (EVM) in 1994. It is the most commonly referenced study regarding the Government Cost Premium of EVM.*

stakeholder by a 2:1 ratio over the next closest (DCMA with 19%). Contractor (KTR) EVM Process Owner (12%), KTR Program Management (10%), and Contracting Officer (8%) were the only other stakeholders identified with any real significance.

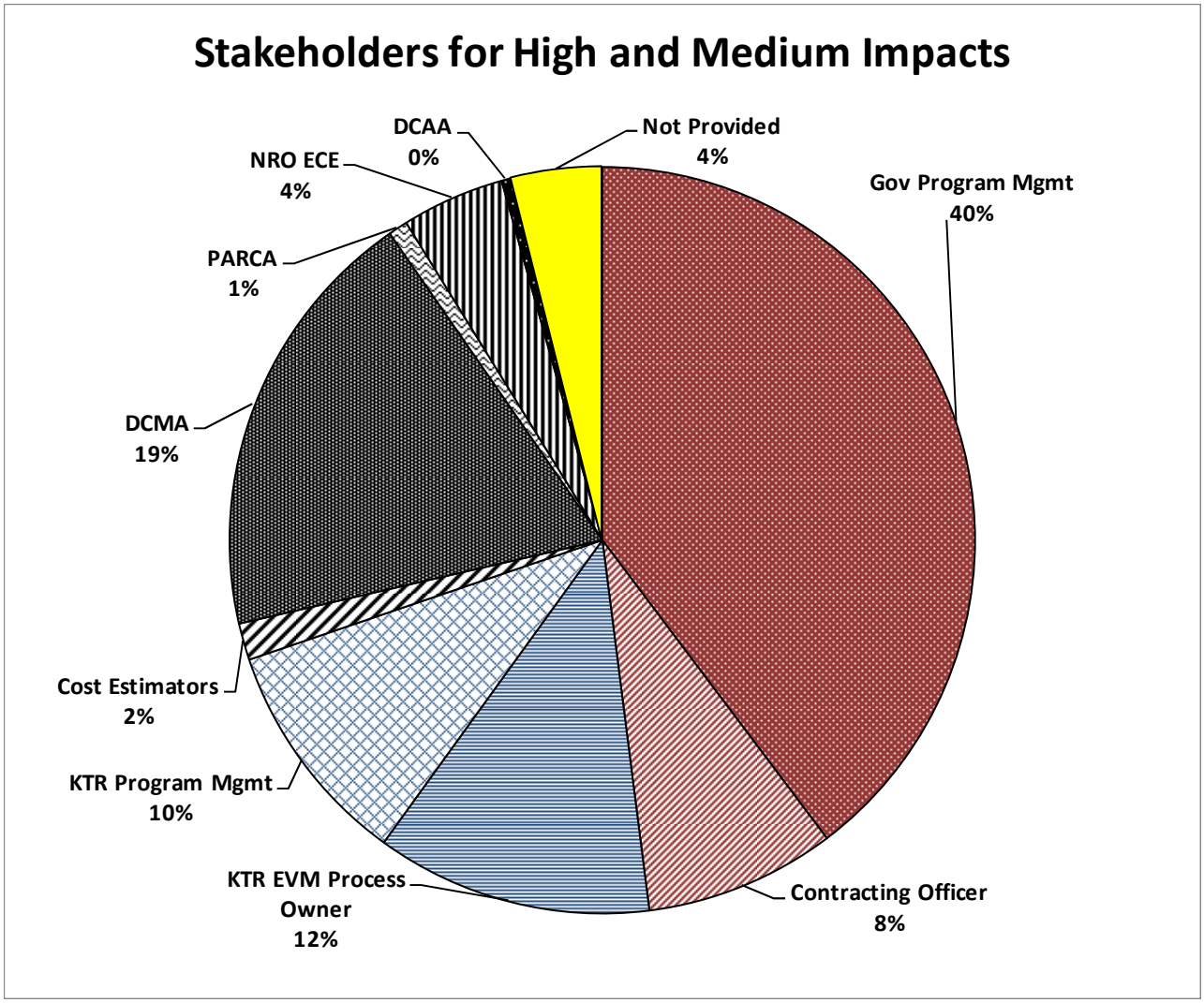

Figure 6 – Stakeholders for High and Medium Impacts

Figure 7 provides raw numbers of stakeholders identified in the survey for the high and medium cost areas. This information is useful when trying to look at the specific number of times any stakeholder was linked to a medium or high impact. Trends of these specific incidences, along with the supporting comments, were used to generate the recommendations listed in this report. In most cases, the ratio of High:Medium for each Stakeholder is close to 1:1. The exception is Contractor (KTR) Program Management which is approximately 1 High for every 2 Medium Impacts identified.

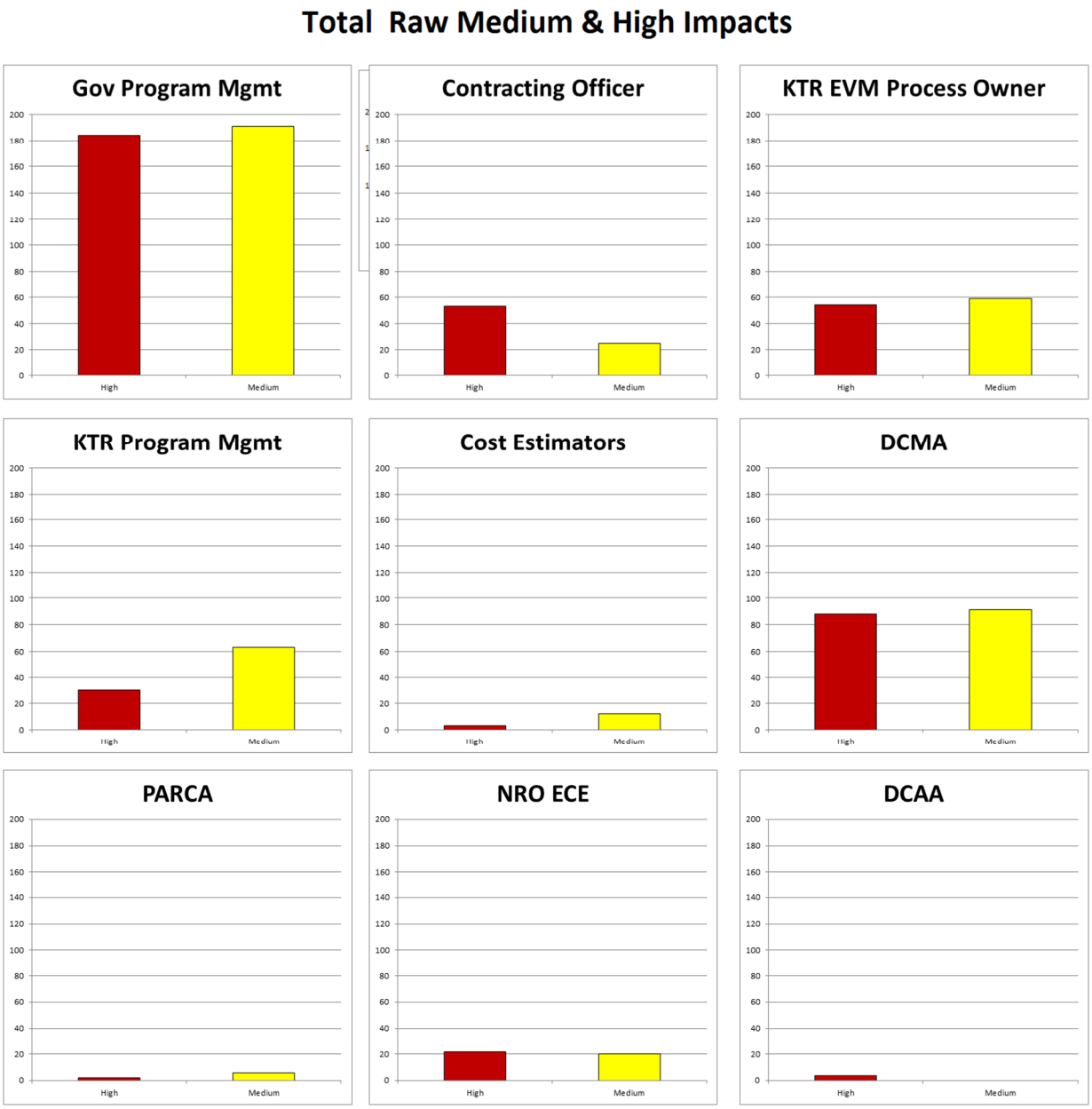

Figure 7 – Total Raw High and Medium Impact Numbers listed by Stakeholder

The survey results also show Government Program Management as a highly significant stakeholder in 12 of the 15 Cost Drivers (*Figure 8*). DCMA is only identified as a highly significant stakeholder in 5 of the 15 Cost Drivers. While in anecdotal terms, DCMA and Oversight are often identified as the significant drivers in generating EVM costs to the government, the JSCC survey identifies Government Program Management as the key stakeholder for *High* and *Medium Cost* Impacts (additional details can be found in *Appendix C – Summary Level Data*).

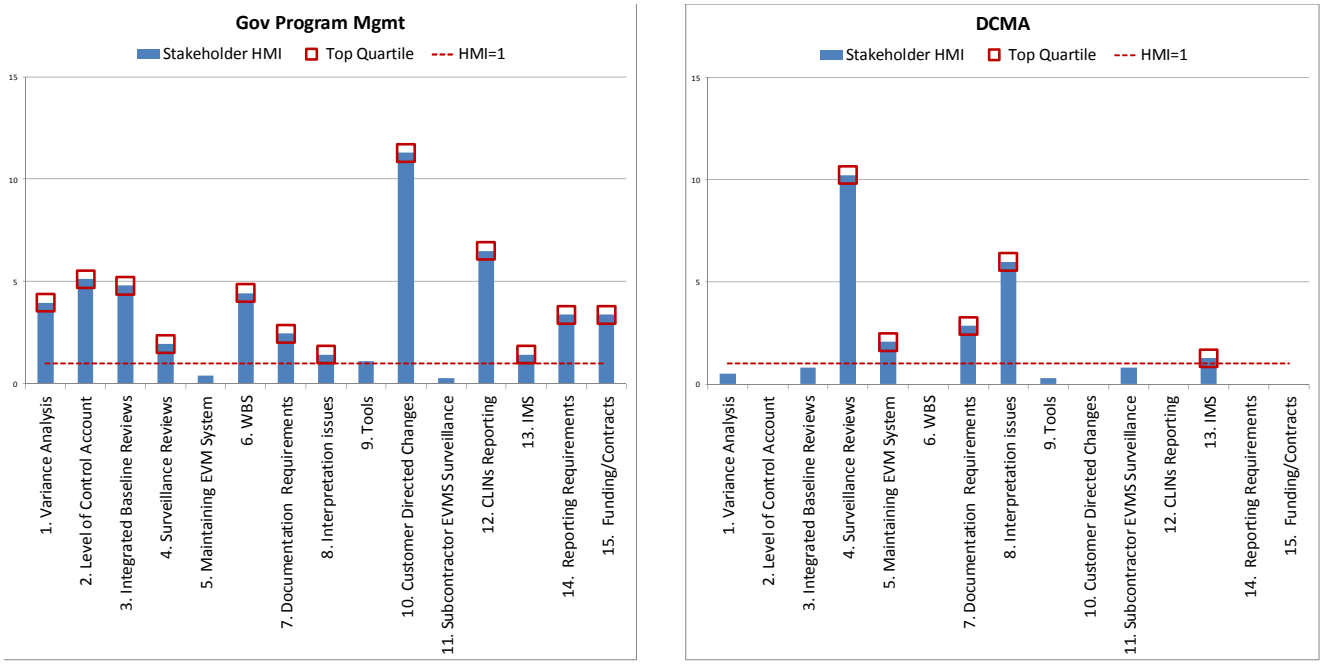

Figure 8 – Stakeholder High Medium Index for Government Program Management and DCMA

Using the data from the JSCC study along with analysis provided by EVM experts, this report will provide specific recommendations and actions for stakeholders for each of these three themes. These recommendations should provide assistance in generating a more efficient approach regarding EVM when applied to Government contracts.

The following are the final JSCC Themes for Better EVM Implementation:

- ***Theme 1:*** *The Control Account level (size and number) significantly impacts the cost of EVM*
- ***Theme 2:*** *Program volatility and lack of clarity in program scope as well as uncertainty in funding may impact the cost of EVMS, just as any other program management discipline*
- ***Theme 3***: *Volume of IBRs and compliance/surveillance reviews and inconsistent interpretation of the 32 EIA 748 Guidelines impacts the cost of EVM*

2.1 *Theme 1:* The Control Account level (size and number) significantly impacts the cost of EVM

When the JSCC EVM Expert Working Group reviewed the survey responses of high and medium impacts and associated comments the working group identified multiple linkages between Cost Areas. Once the re-grouping was completed, the working group developed themes that best described the survey results.

Figure 9 identifies the High-Medium Index[6] for each of the Cost Areas identified by the working group for *Theme 1*.

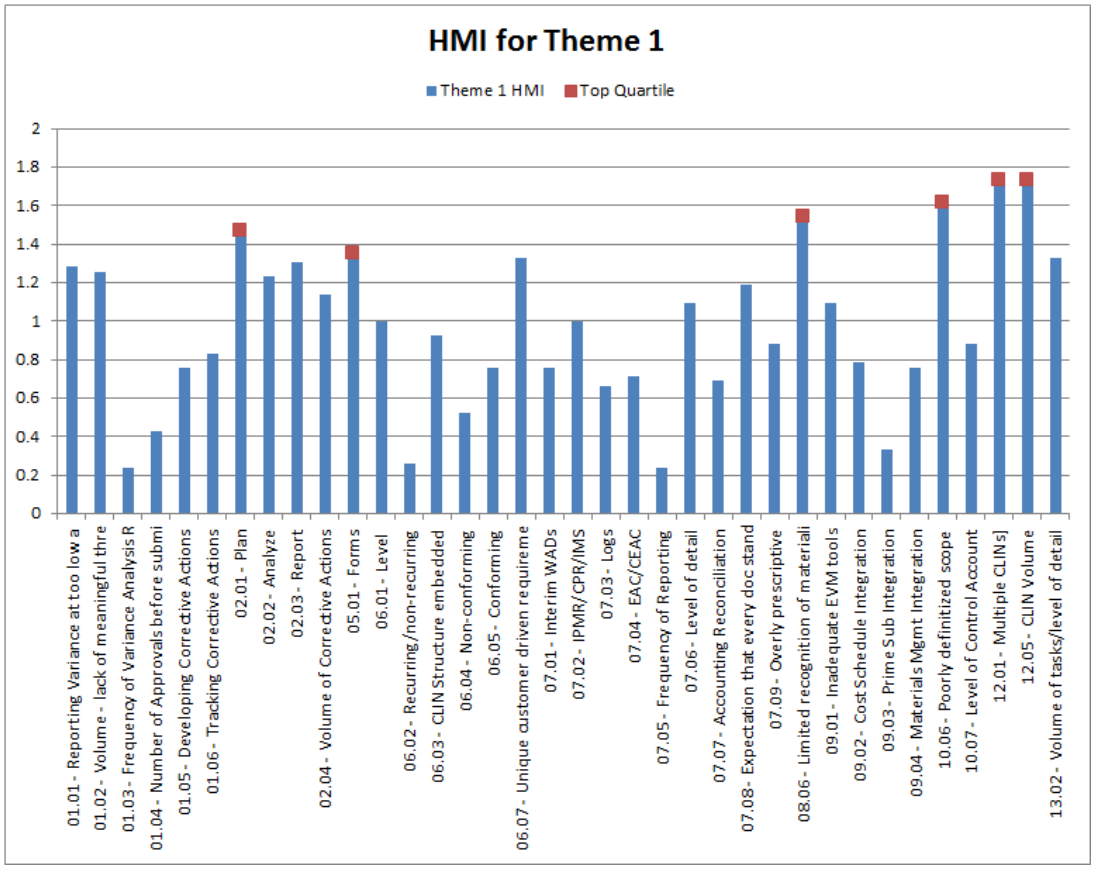

Figure 9 – High-Medium Index (HMI) for Theme 1[7]

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[6] *In order to better understand the data, the JSCC Study Team developed an index to identify which Cost Areas were the most significant relative to the others. This index was performed using the following process: 1) During the survey, each of the 78 Cost Areas was assessed as High, Medium, Low, or No Impact for Every Survey (A total of 46 Assessments for each Cost Area); 2)Values were then assigned to Each Assessment [4 for High, 3 for Medium, 2 for Low, 1 for No Impact]; 4) JSCC Study Group generated a Cost Area Basic Index for Each Cost Area by adding all scores for individual Cost Areas then dividing by 46.*

$$\frac{Score_1 + Score_2 + Score_3 \ldots + Score_{46}}{46}$$

This generated a Cost Area Basic Index for each of the 78 Cost Areas; 5) The 78 Basic Indices (one for each Cost Area) were averaged to determine the mean of all scores; and 6) Once the mean was established, a High-Medium Cost Index (HMI) for each Cost Area was generated by dividing the Cost Area Basic Index by the mean of all Cost Area Basic Indices. This process provided a way to normalize the data in order to understand how Impacts for Cost Areas were relevant to each other.

[7] *The Y-Axis identifies High-Medium Indices (HMI) for each Cost Area in this theme. The HMI was used to rank Cost Areas based on the significance of the type and number of Impacts. The X-Axis lists all Cost Areas for Theme 1 (see Appendix B for a complete list of Cost Areas).*

- ***Survey comments from Industry supporting Theme 1 include:***
    - *If a program is not careful to establish the correct level for Control Accounts this can result in additional time and cost for planning, analyzing, and reporting. Critical to assign Control Accounts at the correct level.*
    - *Should be able to plan at level that makes sense - Set Control Account at much higher level*
    - *There is additional pressure to go to lower levels, including embedding the Quantitative Backup Data directly in the schedule itself*
    - *The number of Control Accounts (CA) plays a big role in the overhead of EV, since CA is the level at which Work Authorization Documents (WADs), Variance Analysis Reports (VARs), Estimate to/at Complete (ETC/EAC), analysis and other activities are being done. If the number of CAs are reduced the overhead associated with EV can be reduced*
    - *We have double the amount of reporting that is traditionally required*
    - *Multiple Contract Line Items (CLINs) cause program to open more charge numbers to track costs - creates huge amount of additional work*
    - *Programs have to reinvent the wheel for certain customers*
    - *Current requirements result in significant number of VARs - VAR thresholds are too low for significant analysis*
    - *"More is better" mentality attributed to Program Management*

To develop targeted recommendations, the JSCC Study Team grouped the 8 individual stakeholders into 3 major categories: Government Program Management (PM), Contractor PM and Oversight organizations. *Figure 10* shows the consolidation of stakeholders by category:

Figure 10 – Consolidated Stakeholders[8]

Theme 1 includes 35 Cost Areas. 25% of all reported impacts for this theme are High or Medium (*Figure 11*). Consolidated Government Program Management is the major High/Medium stakeholder for *Theme 1* with 51% of all High and Medium Impacts (*Figure 12*)

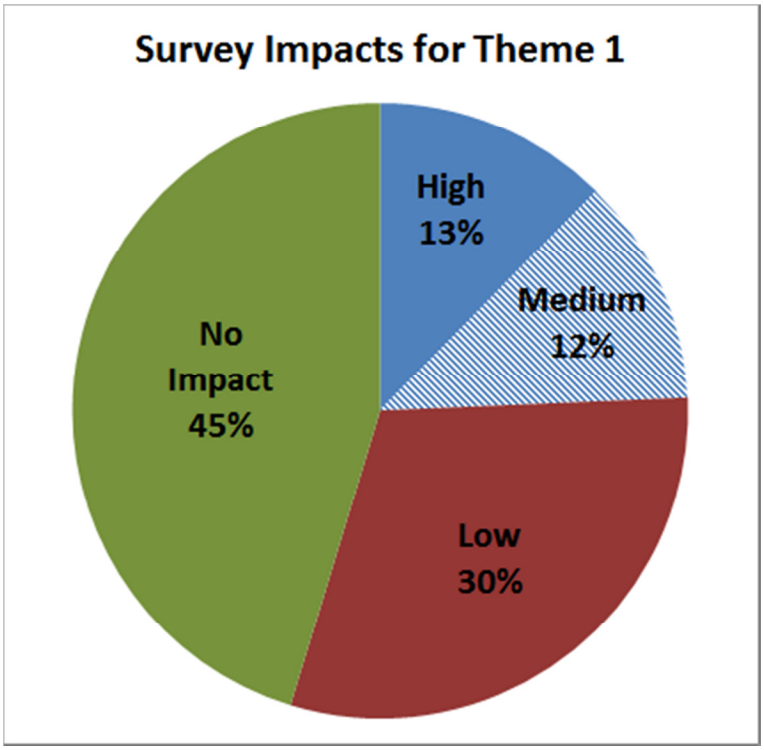

Figure 11 – Survey Impacts for Theme 1

[8] The JSCC recognizes that "Contractor Process Owners" may not be in a company's program management organization. In some companies, this organization or personnel may be in finance.

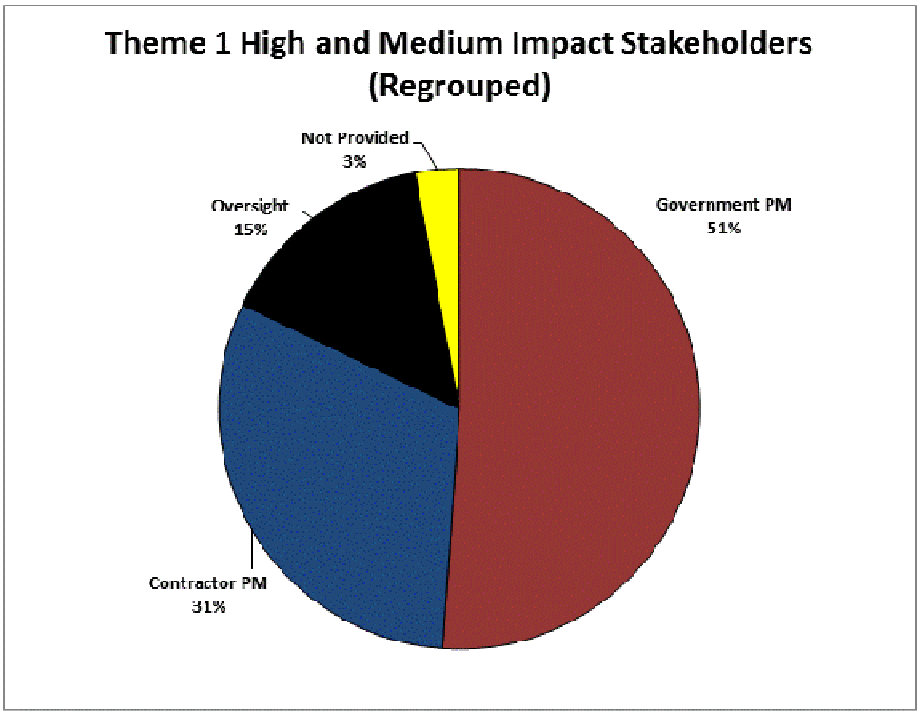

Figure 12 – Theme 1 High and Medium Stakeholders

Raw stakeholder impact values for *Theme 1* are available in *Figure 13*. *Figure 14* identifies the High and Medium Impacts for *Theme 1*.

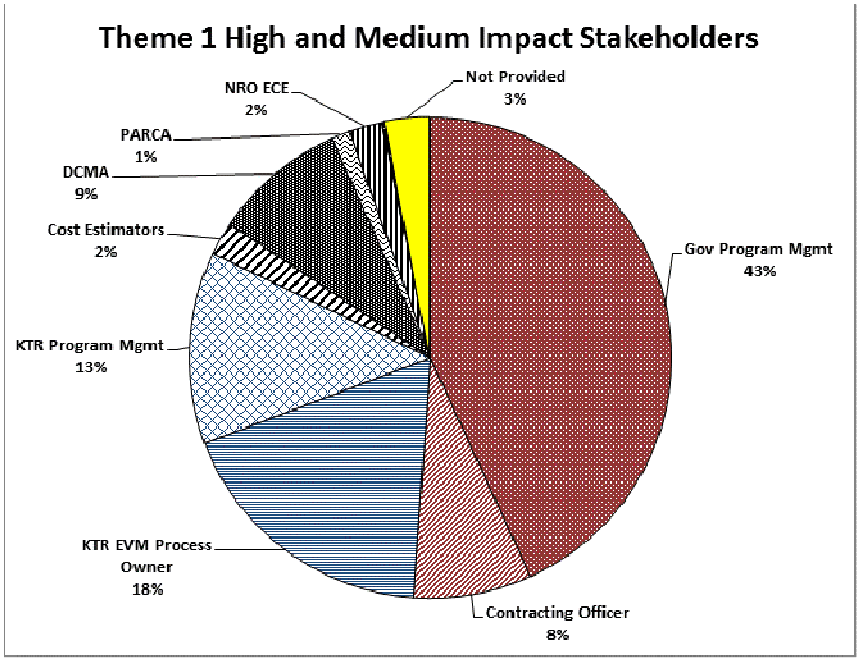

Figure 13 – Theme 1 High and Medium Stakeholders (Regrouped)

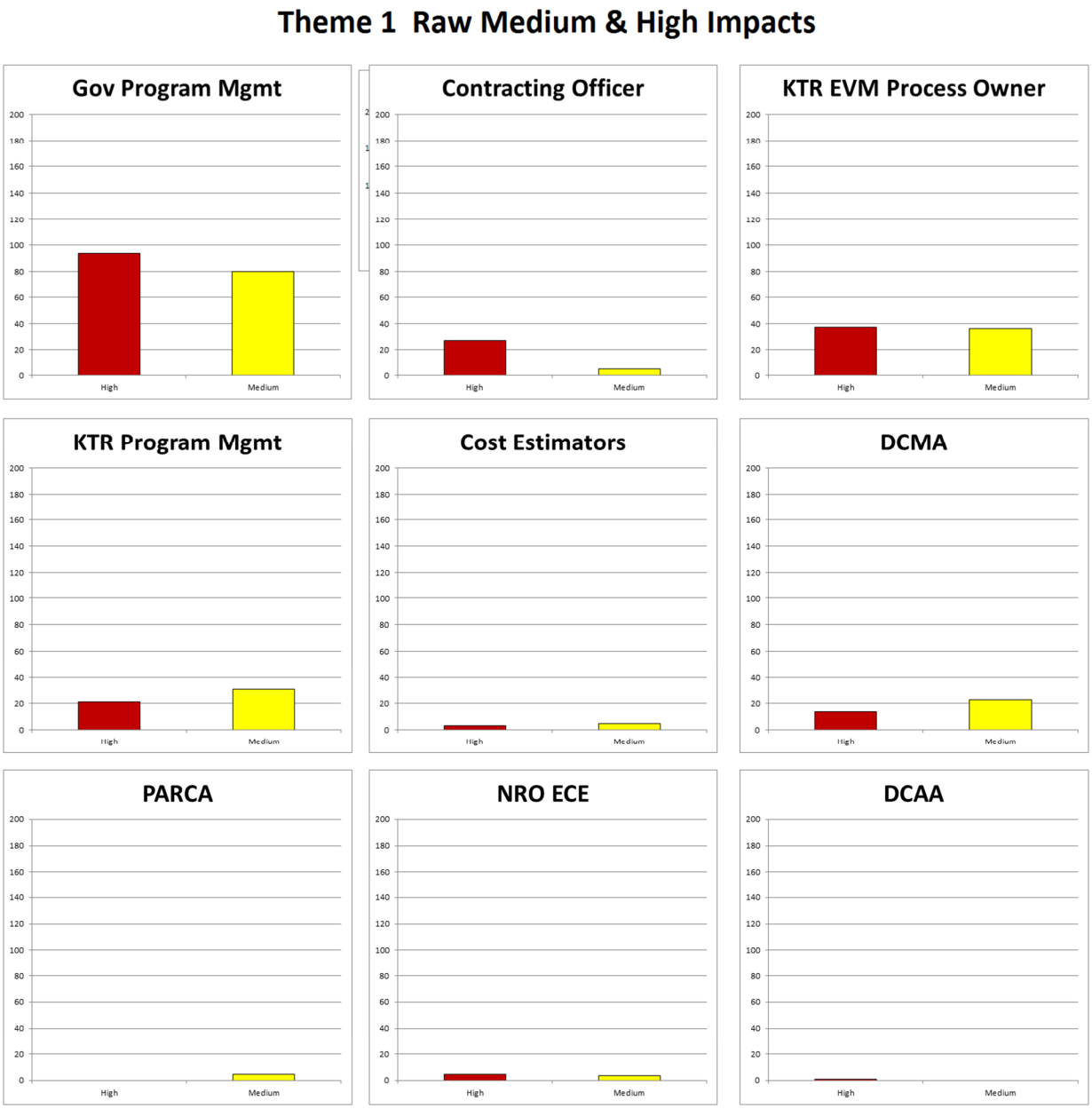

Figure 14 – Theme 1 Raw High and Medium Impact Numbers listed by Stakeholder

Once the theme was developed, the EVM working group created a list associated with *Theme 1* that included the following points:

- Level of detail appears to be correlated to cost.
- Deviation from Standard Work Breakdown Structure (SWBS) or MIL-STD-881C guidance appears to drive program costs, impacts program reporting requirements, and lessens the effectiveness of program management.
- Some Government initial reporting requirements are perceived as being non-value added

- Disconnects between artifacts cause confusion and inefficiency (for example, RFP, Contract Data Requirements List [CDRL], proposal).
- Other related issues include: Contract Line Items (CLINs) and Variance Analysis Reports (VARs), and adherence to and tailoring of MIL-STD-881C

The EVM working group brought the theme and findings to the full JSCC where *Theme 1* was discussed and refined. The JSCC made the following comments and observations on Control Account level impacting cost:

- **Reporting level of detail could have a significant impact on the planning infrastructure for the performance measurement baseline**. Level of Control Accounts impacts the span of control discussion. The EVM Expert Working Group bounded the issue by observing, in a typical program, 1 Control Account Manager (CAM) per 100 engineers is too large a span of control and may not lead to good performance, while 1 CAM per 3 engineers is wasteful. The optimized span of control is somewhere in between. When the customer determines the WBS reporting level, they could be unduly influencing the span of control, rather than providing some degrees of freedom for contractors to establish Control Accounts at the optimal, risk-adjusted level in accordance with their EVMS.
- **Companies can use charge (job) numbers or other reporting mechanisms to collect costs**. The low level of Control Accounts *may* be driven by specific customer reporting requirement(s), which otherwise could be achieved with the flexible use of a charge number structure. Accounting system data (actual cost) is less costly to obtain than EVM data (for budgeted cost of work planned, budgeted cost of work performed, and actual cost of work performed), and a Control Account may not need to be established to collect this data. However, actual cost data alone may not always satisfy some customer reporting requirements if there is a requirement to provide all data associated with a Control Account (e.g., Estimate at Complete, etc.).
- **Setting the reporting level at the appropriate level of the WBS can lead to more efficiency in program execution**. Just as proposals with higher level WBS (2, 3, or 4) may result in better accuracy and quicker turn-around times in parametric cost-estimating (because they do not rely on engineering build-ups), setting the reporting level at the appropriate level of the WBS may lead to more efficiency in program execution.
- **A uniform level of reporting (e.g. WBS level 6) can cause cost with no added benefit**. Although WBS level 6 reporting might be appropriate for a high risk end item, applying the same WBS level uniformly across the entire contract may force the contractor to decompose LOE areas such as quality engineering and program office much lower than is efficient or necessary for oversight.
- **Program management needs to become more aware of the impacts of the levied requirements**. When preparing an RFP, the program office sometimes cuts and pastes a previous RFP rather than carefully considering the level of detail of management insight and reporting needed for the new program. Additionally, Government managers need to understand the linkages between WBS set-up and span of control in program management.

- **Lower levels of reporting increase cost in planning infrastructure, but may help management identify risks and problems early, significantly decreasing program execution costs.**

2.1.1 Theme 1 Recommendation 1: Ensure WBS, Control Accounts and Reporting Levels are appropriate for the contract type, scope, risk and value

During contract initiation and set-up, the Government sets the stage by identifying a work breakdown structure and writing contract data requirements. Prime Contractors also set this up for subcontracts. The contractor often uses the framework defined in the Request-For Proposal (RFP) along with its EVMS Command Media to establish Control Accounts, work packages, charge numbers, and its entire planning and management infrastructure. Decisions made before contract execution have comprehensive implications to the resources employed in the EVMS and the data available to the customer.

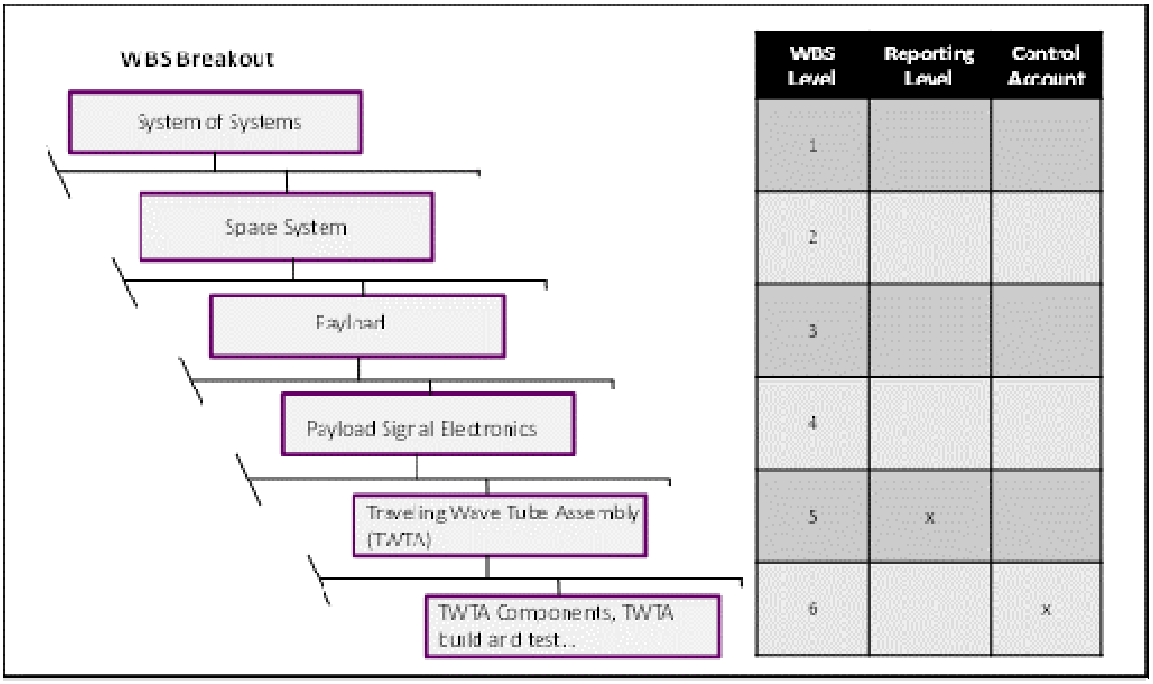

Figure 15 – Relationship of Reporting Levels and Control Accounts[9]

Figure 15 demonstrates the relationship of reporting level and Control Accounts. During initiation, the reporting level and the CA level need to be set for management, insight and span of control purposes.

[9] *Graphic used with permission from Neil Albert/MCR.*

Optimizing for affordability does not mean sacrificing necessary insight into major development programs. The focus needs to be on the consideration of the cost versus benefit of data that the Government needs. For example, avoid defaulting to a commercial standard for a program that, from a technical maturity perspective, does not meet the criteria of a commercial acquisition. If taken to extremes (e.g. one Control Account for a major subcontractor), pursuing affordability can sacrifice diligent management, and creates span of control issues. There needs to be a proper balance between management and reporting requirements for affordability.

Pre-award discussion is necessary to optimize data sources for reporting. For competitive procurements, this would take place at the bidder's conference, or during any formal discussions. For sole source procurements it would take place during negotiations. The purpose of pre-award coordination is to optimize the reporting structure for management, data collection and oversight. Every data requirement does not need to be coded into the WBS.

Industry can provide ideas/expertise for more efficient and effective ways to provide the required data absent of unintended consequences (e.g. excessive cost), and inform the Government of the cost-benefit analysis of CA establishment and to communicate the impact of the Government's actions that could impact the level of Control Account. A barrier to pre-award optimization of EVM for management and reporting is Industry's comfort level of providing constructive feedback to the customer on WBS requirements and CDRLs in the statement of work. In a competitive situation, contractors are strongly incentivized to deliver what is requested, rather than to challenge any inefficient requirements or ask questions. To overcome this barrier, the Government could systematically ask for input and feedback on how to meet its requirements and objectives more efficiently. Implementing this feedback cycle could result in an updated RFP model documents (CDRLs, SOW templates).

Involving the Acquisition Executive at pre- and post- award decision points could ensure: 1) the management structure is aligned to the risk of the program; 2) all Government data reporting needs are being met; 3) the Government has a plan to make use of the CDRL data it is acquiring; and, 4) the Government accepts the contractor's "native form" for data deliveries to the fullest extent possible.

For example, the IPMR DID establishes the UN/CEFACT XML schema format for EVM data delivery. As a result, the Defense Cost and Resource Center (DCARC) are moving towards XML delivery of data. The Government should carefully consider the value of also requesting additional deliverables such as MS Excel extractions of the EVM data.

Stakeholders with data reporting requirements also need to be assured that their needs can and will be met. At the start of a contract, ensure that contract is structured such that funding, WBS, CLIN structure, billing

and reporting requirements are discussed in unison to minimize administrative burden in each of these areas.

Table 1 provides a list of suggested actions for specific stakeholders pertaining to *Theme 1 – Recommendation 1* (*Ensure WBS, Control Accounts and Reporting Levels are appropriate for the contract type, scope, risk and value*).

Table 1 – Theme 1 Recommendation 1 Stakeholders and Suggested Actions

Theme 1 Recommendation 1: Ensure WBS, Control Accounts and Reporting Levels are appropriate for the contract type, scope, risk and value	
Stakeholder	**Suggested Action**
Government PM*	Information that can be provided in technical interchange meetings, ad hoc deliverables, and by accounting allocations should not be formalized in EVM via restrictive and expensive reporting mechanisms, such as CLIN reporting requirements, extra WBS elements, etc. Consider financial and cost reporting alternatives versus coding all reporting requirements into the WBS and Control Account structure. Do not use the requirements for cost estimating (e.g. recurring/non-recurring split) to dictate WBS, or finance (cost collection by asset) to expand the WBS. Systematically ask for input and feedback on how to efficiently meet requirements and objectives. **Note: Government Program Management recommendations apply to Contractor Program Management, when contractors are managing subcontractors.*
Contractor PM	When extending the CWBS, carefully consider reporting requirements as well as span of control issues to set the appropriate level. Set Control Accounts appropriately, rather than defaulting to a standard approach such as setting them a level (or more) below Government reporting requirements. Provide ideas/expertise for more efficient and effective ways to provide the required data absent of unintended consequences (e.g. excessive cost), inform the Government of the cost-benefit analysis of CA establishment, and communicate the impact of the Government's actions that could impact the level of Control Account.
PARCA	Establish a requirement for the Acquisition Executive to review and approve the reporting matrix to ensure consistency in the results of pre-award coordination.

2.1.2 Theme 1 Recommendation 2: Define a product oriented WBS and do not allow it to be replicated by CLIN or other reporting needs

Stakeholders in the contracting and financial management communities sometimes look to the CLIN structures to meet their reporting needs, and sometimes go so far as to embed CLINs in the WBS. In order to segregate satellite development costs by individual satellite, program control groups, costing estimators, audit teams, and other functional stakeholders will sometimes require reporting by CLIN.

The proliferation of CLINs can drive the size and number of Control Accounts, because the CLIN structure can act as a multiplier to the WBS (sometimes each WBS element is repeated by CLIN) and subsequently to the number of Control Accounts. The added complexity adds costs to planning, managing and reporting through the life of the program. The Government should be judicious in the number of CLINs and the CLINs should be able to map to the WBS. Additionally, Contractors should ensure that they do not unnecessarily create separate control accounts (for similar or the same work) for each CLIN if the contractors charge number structure has a flexible coding structure supporting by-CLIN traceability for internal management control and adequate cost collection summarization. Communication between Government and Industry can result in other ways for stakeholders to obtain the information required.

Additionally, the Government should avoid broad direction for the contractor to report to a particular level of MIL-STD-881C. To illustrate, it would be appropriate and desirable to manage and report at the default level 5 of MIL-STD-881C Appendix F for a high-cost, space hardware component. On the other hand, driving the reporting level for program management down to the same level as the high-cost space hardware component may be inefficient. To achieve a reporting level that is consistent with the way work is being managed, Government and Industry need to communicate and be flexible enough to establish the optimal solution.

Figure 16 and *Figure 17* illustrate the difference between a reporting level resulting from a statement like "The contractor shall report EVM at level 4 of the WBS" and an optimized reporting level agreed to by the Government and prime contractor that enables management by exception. The optimized structure drives down to lower levels for riskier elements.

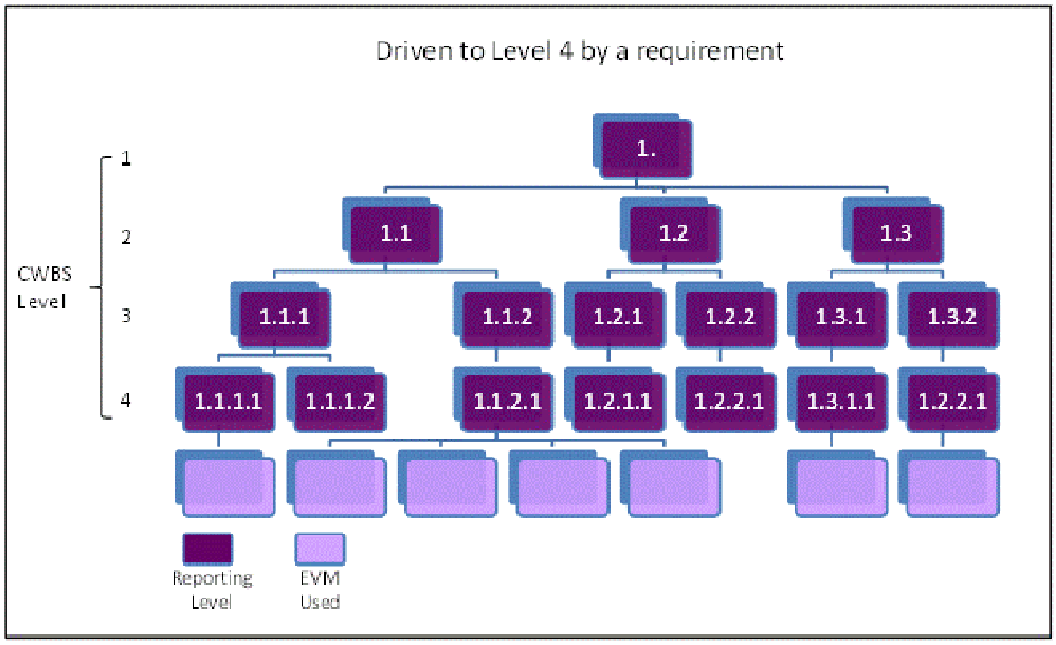

Figure 16 – Forced Reporting Requirements

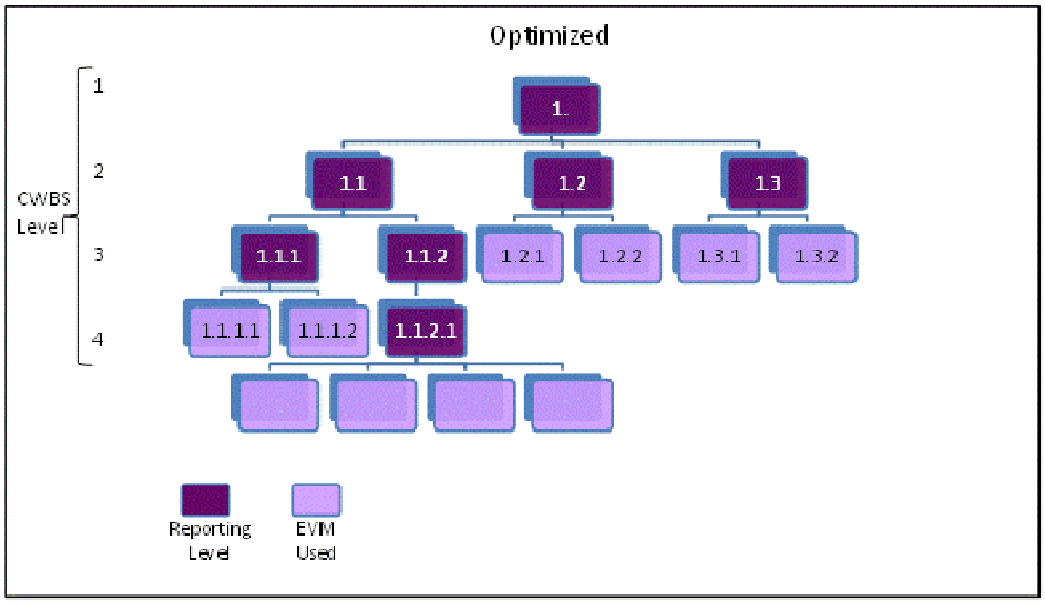

Figure 17 – Optimized Reporting Requirements

The Contract Work Breakdown Structure (CWBS) is the contractor's discretionary extension of the WBS to lower levels. It includes all the elements for the products (hardware, software, data, or services) that are the responsibility of the contractor. The lowest CWBS element in itself may not necessarily be a Control

Account. A control account (CA) is a management control point at which budgets (resource plans) and actual costs are accumulated and compared to earned value for management control purposes.[10] Individuals who are involved in the development of the RFP should have training and information available regarding the impact of requesting a specific level of reporting, as those decisions could inadvertently drive the number of control accounts.

Industry often has cost efficient strategies to share which may be perceived as unresponsive to the proposal requirements with potential for negative assessment of their competiveness. In competitive solicitations, Government acquisition managers may not have clear insight into the contractor's EVMS until after the winning offeror has been selected. Discussion of potential changes to program EVMS set-up should take place as soon as possible after contract award.

Table 2 provides a list of suggested actions for specific stakeholders pertaining to *Theme 1 – Recommendation 2* (*Define a product oriented WBS and do not allow it to be replicated by CLIN or other reporting needs*).

Table 2 – Theme 1 Recommendation 2 Stakeholders and Suggested Actions

Theme 1 Recommendation 2: Define a product oriented WBS and do not allow it to be replicated by CLIN or other reporting needs	
Stakeholder	**Suggested Action**
Government PM	Conduct a post-award conference within 60 days of contract award to verify that the reporting requirements for WBS and related CDRLs meets the needs for both the Customer and the Contractor (holding this as soon as possible after award can improve program EVMS set-up). Include the phrase "for cost collection only" in RFP and Contract language in order to clarify requirements for cost reporting that do not necessarily apply to EVM reporting and to help Industry provide the data without expanding the CWBS and the IPMR. Do not require the same CDRL in separate instances by CLIN. Avoid broad direction for the contractor to report to a particular (uniform) level of MIL-STD-881C. Consider requiring an offeror to provide a non-dollarized Responsibility Assignment Matrix (RAM) in the proposal management volume for evaluation of the contractor's proposed extended CWBS and organization.

[10] *https://dap.dau.mil/acquipedia/Pages/ArticleDetails.aspx?aid=80533d01-b4d8-4129-a2c6-d843de986821*

Contractor PM	Avoid over-complicating an EVMS infrastructure implementation by establishing separate instances of EVM engine databases by CLIN. When the RFP embeds CLINs or other reporting requirements in EVM reporting requirements, offer alternative methods such as charge codes or standard reports to satisfy independent program needs for cost, funding management, and performance management objectives (this communication should take place pre-award, during negotiations, post-award).

2.1.3 Theme 1 Recommendation 3: Include EVM expertise in RFP and Proposal Review panels and processes

Codifying touch points of communication between Government and contractors, financial managers and system engineers, acquisition professionals, and program managers is critical to Better EVM Implementation. It is imperative that each participant in the acquisition process understand the down-stream impacts that their decisions can have on the overall acquisition process.

Table 3 provides a list of suggested actions for specific stakeholders pertaining to *Theme 1 – Recommendation 3* (*Include EVM expertise in RFP and Proposal Review panels and processes*).

Table 3 – Theme 1 Recommendation 3 Stakeholders and Suggested Actions

Theme 1 Recommendation 3: Include EVM expertise in RFP and Proposal Review panels and processes	
Stakeholder	**Suggested Action**
Government PM	Establish teams with the appropriate skill mix. EVM expertise could help guide the program manager in a pragmatic and practical way through the RFP and acquisition process. Understand the impact of RFP language on the number of Control Accounts.
PARCA	Review and update the EVM competency model for Government program managers and technical managers so that they understand the impact of effective structuring of a WBS and distinguishing EVM reporting versus cost collection requirements. Establish training at different levels of the acquisition community. Teaching objectives need to be specific to the audience. Reemphasize to buying Commands that RFPs include consideration of the downstream effects of the WBS and the reporting level-of-detail placed on contract. Establish controls to ensure the RFP is reviewed for EVM considerations and impact. The Component Acquisition Executive should assure sufficient coordination and optimization at appropriate decision points.

Contractor EVMS Process Owner	Review and update the EVM competency model for contractor program managers and technical managers so that they understand the impact of effective structuring of a WBS and establishing EVM reporting versus cost collection requirements. Establish training at different levels of the organizational structure. Teaching objectives need to be specific to the audience.

2.1.4 Theme 1 Recommendation 4: Re-evaluate management structure and reporting levels periodically to optimize EVM reporting requirements and levels commensurate with program execution risk

When parts of a program transition from development to operations and maintenance (e.g. ground software, which is required prior to the first launch, but continues at a low level steady state through the life of the satellite-build contract), there is insufficient motivation/direction/precedent for scaling back the EVM reporting requirements (CWBS Level(s), formats, managerial analysis, etc.) and the associated EVMS infrastructure. The current CPR/IPMR Data Item Description (DID) only briefly comments on addressing the potential change in level of reporting over time.

> *DID 3.6.10.2.1 states "Variance analysis thresholds shall be reviewed periodically and adjusted as necessary to ensure they continue to provide appropriate insight and visibility to the Government. Thresholds shall not be changed without Government approval."*

Industry feedback indicates that the current wording of reporting requirements "reviewed periodically" is not sufficiently specific or certain to direct them to bid lower reporting costs for an element during that element's O&M phase. The ability to vary the reporting level(s) over the contract lifecycle phases may enhance affordability. Industry should initiate discussion of optimal reporting levels. Reporting at a higher level of the WBS during O&M, may allow the contractor to propose fewer CAMs, planners, cost analysts, etc.; as well as, down-scale investments required to maintain the EVMS infrastructure for the current and/or future contract phases. However, in the event that follow-up development may be required, care must be taken to ensure that unnecessary non-recurring costs are not incurred to re-establish EVM infrastructure support.

Table 4 provides a list of suggested actions for specific stakeholders pertaining to *Theme 1 – Recommendation 4* (*Re-evaluate management structure and reporting levels periodically to optimize EVM reporting levels commensurate with program execution risk*).

Table 4 – Theme 1 Recommendation 4 Stakeholders and Suggested Actions

Theme 1 Recommendation 4: Re-evaluate management structure and reporting levels periodically to optimize EVM reporting levels commensurate with program execution risk	
Stakeholder	**Suggested Action**
Government PM	Identify the points (e.g. events or milestones) at which management structure and reporting requirements should be reevaluated based on data needs and program risk.
Contractor PM	On a continuing basis, initiate discussion of optimal reporting level and frequency.
PARCA	Ensure the new "EVMIG" addresses this recommendation and provides templates that make periodic reevaluation part of an ongoing process.

2.2 *Theme 2*: Program volatility and lack of clarity in program scope as well as uncertainty in funding may impact the cost of EVMS, just as any other Program Management Discipline

The EVM Expert Working Group reviewed the survey responses of high or medium impacts to identify potential linkages between the Cost Areas that support *Theme 2*. *Figure 18* identifies the High-Medium Index for each of the Cost Areas identified by the working group for *Theme 2*.

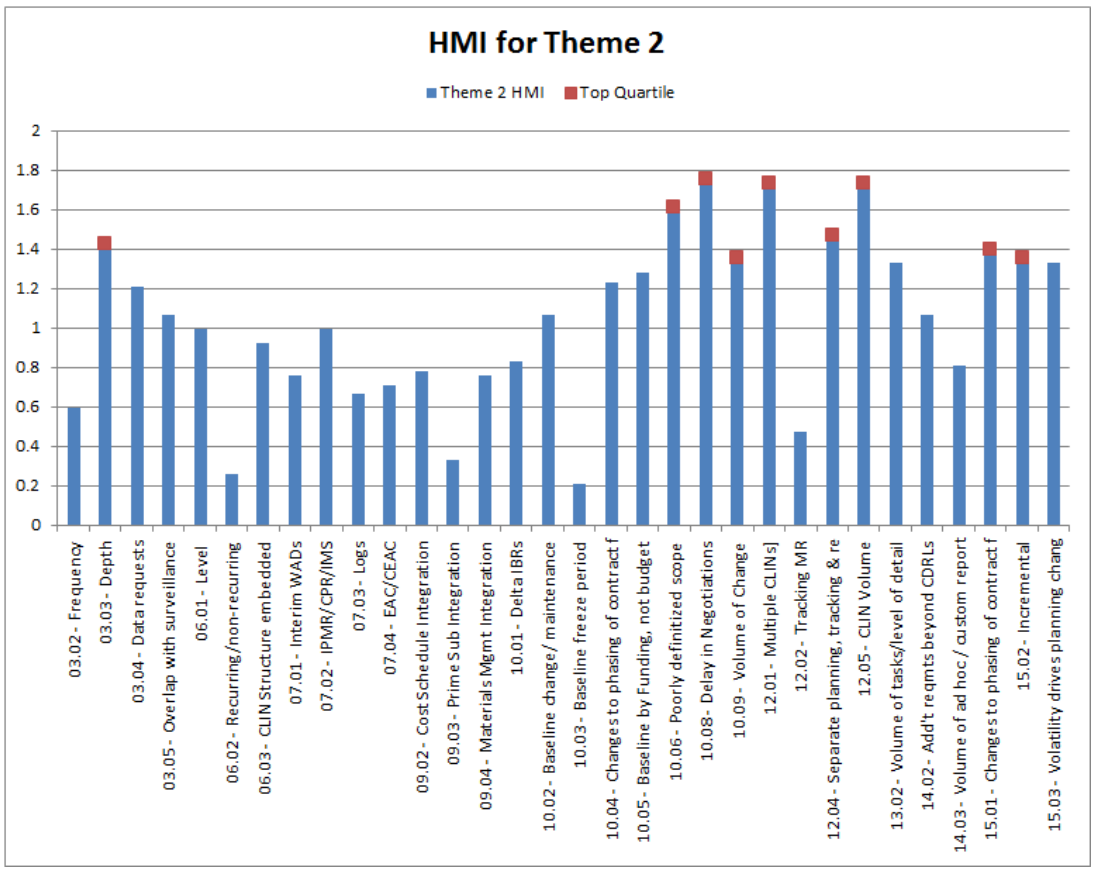

Figure 18 – High-Medium Index (HMI) for Theme 2

- ***Survey comments from Industry supporting Theme 2 include***:
  - *A high number of ECPs (did you know what you really wanted?), a cancelled RFP, a stop work/descope, funding constraints and many other technical decisions have resulted in an unclear path forward to execute*
  - *Many baseline changes per month (external change)*
  - *In space programs and the current Government acquisition environment, program volatility is a given, so recommendations need to address how to plan and execute most efficiently, despite these challenges.*
  - *Planning to funding is more work, since funding is provided in "dribs and drabs" of 3-month increments rather than at least a year at a time for 5-year programs. In this uncertain budget environment, even if contractors were allowed to plan larger increments of the program, they might not want to plan something whose execution is uncertain.*
  - *Funding is driving how budgeting is performed and it drives constant re-planning*
  - *Funding limitations causes sub-optimal planning*
  - *Negotiating actuals, by the time you negotiate… actuals*
  - *Additional CLINs act as a multiplier of CA's adding additional administration*

- *CLIN structure addition add no extra value to program management*

Theme 2 includes 32 Cost Areas. 28% of the impacts for this theme are High or Medium (*Figure 19*). Consolidated Government Program Management is the major High/Medium stakeholder for *Theme 2* with 67% of all High and Medium Impacts (*Figure 20*).

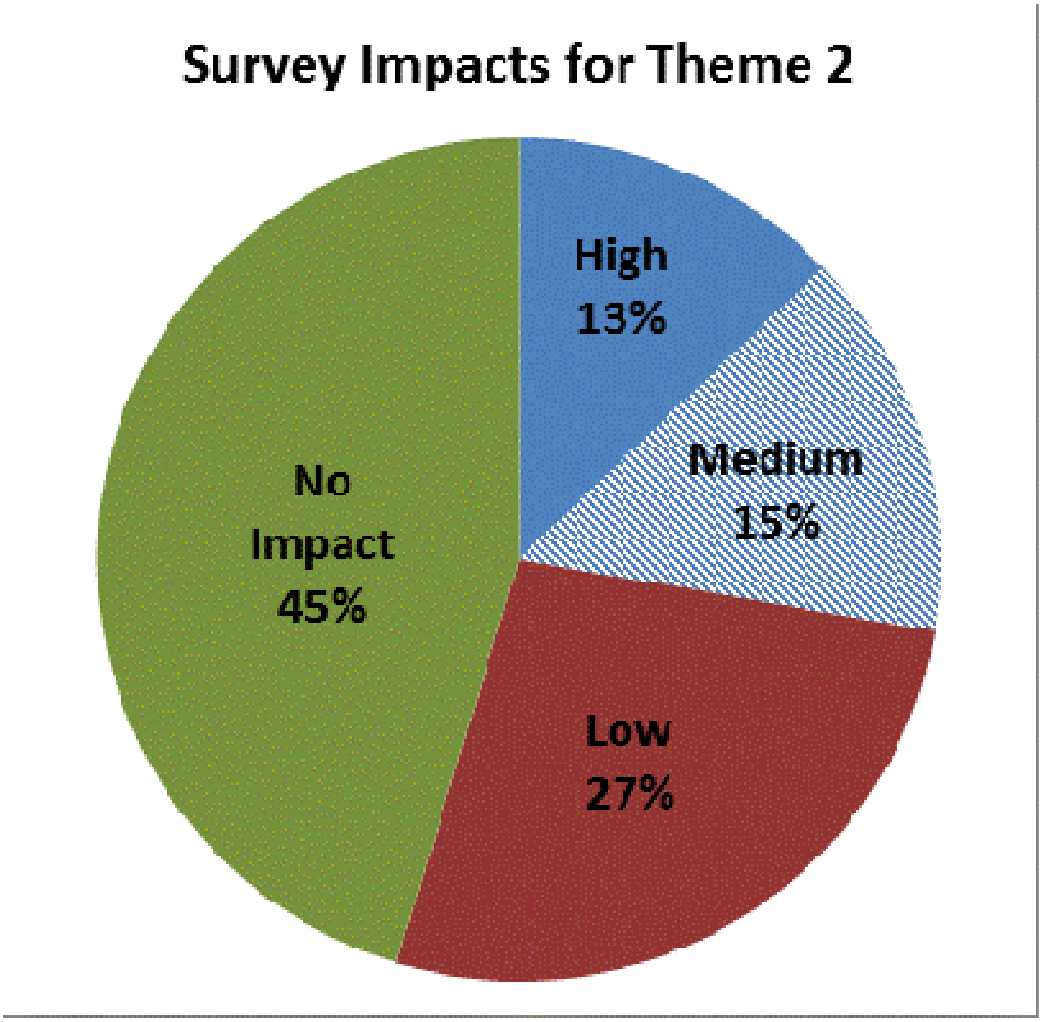

Figure 19 – Survey Impacts for Theme 2

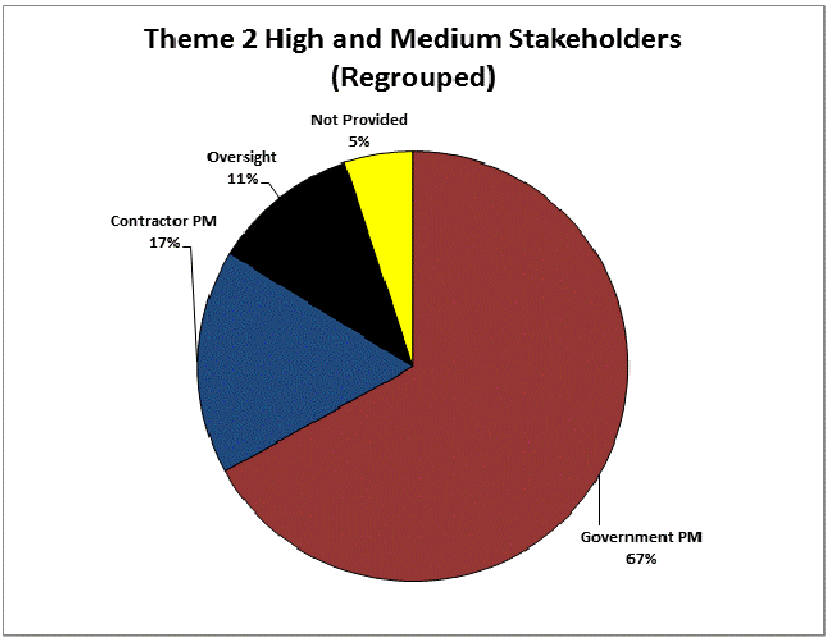

Figure 20 – Theme 2 High and Medium Stakeholders

Raw stakeholder impact values for *Theme 2* are available in *Figure 21*. *Figure 22* identifies the High and Medium Impacts for *Theme 2.*

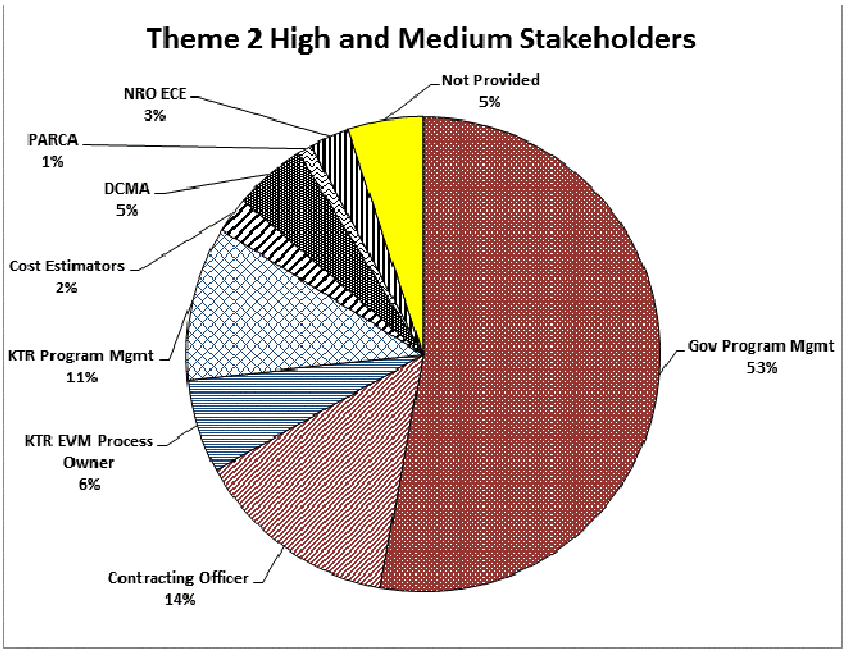

Figure 21 – Theme 2 High and Medium Stakeholders (Regrouped)

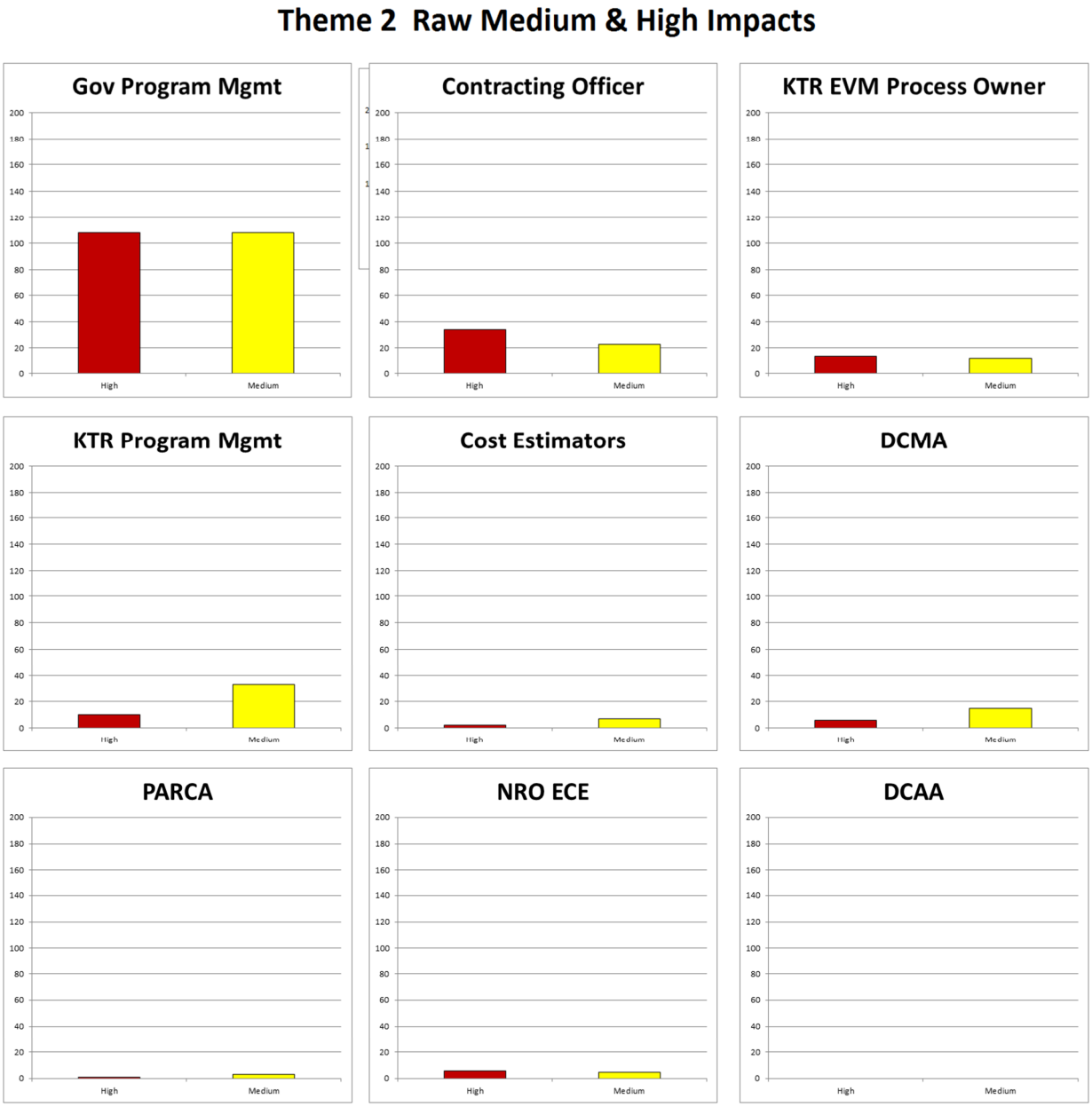

Figure 22 – Raw High and Medium Impact Numbers listed by Stakeholder for Theme 2

The JSCC EVM working group agreed that *Theme 2* includes the following points:

- Volatility of change can be an indication of unstable requirements and lack of clear Government direction.
- Lack of clarity of requirements during planning can be closely tied to volatility during execution
- A Milestone Decision Authority giving the 'go-ahead' to proceed with acquisitions does not always appear to be associated with clearly defined requirements
- Pre-award negotiations can significantly impact scope (additions or reductions)

- Changes in funding, schedule, and scope create volatility
- It can be difficult to plan when funding is provided 1-2 months at a time. As a result, plans only cover the next month or two. Funding for a longer period (12-18 months) would dramatically improve planning and execution.
- Other related issues include: Stop Work Orders and Customer Directed Changes (10 of the top 20 Cost Areas)

The full JSCC discussed *Theme 2*, and made the following comments and observations

- ❖ Lower level of detail of reporting without scope clarity does not usually result in quality data.
- ❖ Baselining to funding rather than the entire contract scope is not an effective way to manage a program with EVMS.
- ❖ A particular contract was cited as having a corrosive contracting process. The program received 400 modifications in a single year to incrementally add scope. This had a major effect on how the program was managed. The extreme volatility impacted not just the program controls team, but the CAMs and engineers as well. When a program experiences frequent and significant customer directed changes, the contractor's change management practices for planning and executing Authorized Unpriced Work must be efficient and timely.
- ❖ In another case, the Government issued a contract modification for $100 million, with an NTE amount of $600k. The remainder of the work was baselined $600k at a time, creating volatility and decreasing visibility into performance against the scope of work.

Theme 2 addresses fundamental characteristics of the acquisition environment, with implications beyond EVM. Changing the way Congress establishes a budget, removing uncertainty from high-risk development programs, or leveling the vicissitudes of program change is outside the scope of this study. *Theme 2* is closely related to *Theme 1* – the level at which a program is planned, managed, and reported greatly influences the program's capabilities for managing and incorporating future changes in the event the Customer may have frequent engineering change requests. Additionally, the capability of the Contractor's EVMS infrastructure for planning and change control management must be scaled to sustain configuration management and control of authorized contract changes.

2.2.1 Theme 2 Recommendation 1: Scale the EVM/EVMS Implementation (depth) to the Program based on program size, complexity and risk. EVMS includes people, processes and tools.

Industry needs to ensure EVM Systems are optimized and scalable in a dynamic acquisition environment. While in some cases, Government program management believes the benefits of low level (detailed) reporting are worth the cost, there may be numerous instances where EVM scalability can provide savings and management efficiencies.

Companies employ enterprise tools, but do not always plan for how a dynamic environment potentially changes the use of the standard tool/job aids. For example, Budget Change Request (BCR) processing could be streamlined on programs with less stable requirements. If a program is excessively dynamic, the program's baseline freeze period might need to be shortened in support of rolling wave planning activities and greater flexibility in the Baseline Change Request process.

Scaling an EVMS should not be considered synonymous with employing "EV Lite," where only a subset of the 32 EIA 748 guidelines would be followed. The acquisition community needs to acknowledge that all 32 guidelines are part of program management.

Sometimes the initial establishment of a supplier's EVMS is driven by the requirements of the largest program(s) rather than based on supplier's future program-specific acquisition strategy and risk. A smaller program should have the option to scale the implementation of EVM based on size and complexity of the program.

One barrier to scalability is that the contractor program management staff often "follows the letter of the procedures" and hesitates to consider and/or request approval to customize or scale their command media. To overcome this, EVMS training needs to focus on business considerations as well as the documented management processes. Another barrier to EVMS scalability may be risk aversion to Corrective Action Requests (CARs) from oversight. JSCC recommends that NDIA draft EVMS scalability guidance that is commensurate with the size, complexity and risk of programs within a single management system.

Table 5 provides a list of suggested actions for specific stakeholders pertaining to *Theme 2 – Recommendation 1* (*Scale the EVM and EVMS Implementation (depth) to the Program based on program size, complexity and risk. EVMS includes people, processes and tools*).

Table 5 – Theme 2 Recommendation 1 Stakeholders and Suggested Actions

Theme 2 Recommendation 1: Scale the EVM and EVMS Implementation (depth) to the Program based on program size, complexity and risk. EVMS includes people, processes and tools.	
Stakeholder	**Suggested Action**
Government PM	Include EVM as part of the acquisition strategy (coordination check list to ensure appropriate application) ensuring the correct people on the team early in the process to make the decisions – complete the process using appropriate governance to ensure the tools are aligned with the acquisition. Avoid copy and paste from prior procurement's EVM requirements. Be cognizant that the wording of CDRLs can impact the level at which the contractor establishes Control Accounts.

Contractor EVMS Process Owner	Educate the contractor program management office at contract start-up.
Contractor PM	Avoid establishing Control Accounts many levels below the Government's reporting requirements.
PARCA	Provide OSD Guidance on Waivers and Deviations to ensure EVM is appropriately applied. (appropriate program size and contract type) Train the buying community. Use governance process to ensure EVM expertise employed in RFP development process.
NDIA	Define EVMS scalability to ensure there is a common understanding between Government and Industry. Ensure supplier's system descriptions adequately describe how to establish effective and sustainable spans of control (related to Guidelines 1-5) when companies have programs with different sizes, risk and complexity and an array of customers and acquisition environments.

2.2.2 Theme 2 Recommendation 2: Plan the authorized work to an appropriate level of detail and time horizon, not just the funded work

Planning includes summary level planning packages, detailed planning, or undistributed budget. The time horizon of the authorized work and funding profile should influence the type of planning. If the acquisition environment is so dynamic that the authorized unpriced work cannot be fully planned, then plan using undistributed budget or summary level planning packages.

Given the necessity for change, there could be more than one way for a warranted contracting officer to authorize changes to a cost-type contract using an NTE, which may have different EVMS implications:

- The NTE may be reflective of the entire price of the change order for the authorized work, not constrained by the incremental funding limitation.
- The NTE may not be reflective of the estimated value of the authorized work, but may be explicitly related to the incremental funding limitation.

Nevertheless, a company with a validated EVMS must have the capability to plan for customer directed changes which may accommodate different contracting officers' uses of the term NTE without unintended consequences.

The JSCC recommends the DoD DID be updated to move the following IPMR Guide paragraph 4.4.2 language into the IPMR DID:

> The EVM budgets must be sufficient to represent a realistic plan to capture all scope on contract. EVM budgets are applied without the constraint of funding or not-to-exceed (NTE) limitations. Just

as incrementally funded contracts should establish an EVM baseline for the entire scope of work, AUW baselines should represent all authorized scope. AUW is determined by the PCO in the scope provided in the authorization. It may reference a contractor provided rough-order-magnitude or certified pricing. The contractor responds to the AUW authorization by placing the near term budget into the applicable Control Accounts and the remainder in undistributed budgeted until negotiation and incorporation into the contract (and removal from the AUW).

A barrier to effective use of AUW may be the contractor's hesitation to develop a detailed plan that might not be funded. This may be due to a contractor's lack of understanding of the Undefinitized Contract Action (UCA) scope and the unwillingness to make planning assumptions in the face of uncertainty, which may lead to performance that might become "off plan" up to and through negotiations and definitization. Therefore, the JSCC recommends that both parties bilaterally ensure mutual understanding of the UCA scope to the maximum extent practicable to foster more contractor ownership of planning the authorized unpriced work. Accordingly, contractors must be willing and able to make planning assumptions in the face of uncertainty if work is commenced.

Table 6 provides a list of suggested actions for specific stakeholders pertaining to *Theme 2 – Recommendation 2* (*Plan the authorized work to an appropriate level of detail and time horizon, not just the funded work*).

Table 6 – Theme 2 Recommendation 2 Stakeholders and Suggested Actions

Theme 2 Recommendation 2: Plan the authorized work to an appropriate level of detail and time horizon, not just the funded work	
Stakeholder	**Suggested Action**
Government PM	Do not force a detailed plan of the entire scope of the contract when there is likely volatility in the future.
Government Oversight	Ensure adequate guidance is available to understand the 60-day 'rule of thumb' to distribute undistributed budget.
Contractor PM	Use Authorized Unpriced Work (AUW) to establish scope for the entire near term plan rather than just developing a project plan for the amount of incremental funding provided.
PARCA	Consider updating the DoD DID to move IPMR Guide paragraph 4.4.2 language into the IPMR DID. Provide FIPT guidance that encourages program managers to understand proper ways of planning, so there are no unintended consequences (update EVMIG).

Contractor Process Owner	Ensure that Contractor's EVM system descriptions adequately describe how to address planning authorized unpriced work based upon customer directed changes. Also, Contractor process owners should be aware of the differences between the IPMR DID and guide language.

2.2.3 Theme 2 Recommendation 3: Align the IBR objectives to focus on the risk, pre- and post- award to assess the contractor's ability to deliver mission capabilities within cost, schedule and performance targets.

Due to constantly evolving mission needs, the Government acquisition environment frequently requires programs to adapt. Less technically mature programs will naturally have more volatility, but making technological progress is necessary to meet the mission need. This recommendation addresses approaches to managing program volatility.

Considerations could include:

- Funding (changes in funding, funding profile that does not fit technical approach)
- Maturity of Technical Requirements
- CLINs (excessive focus by CLIN, rather than the comprehensive scope of the contract)

The survey identified issues impacting EVMS, but also incorporated a broader acquisition environment. 11 of 78 Cost Areas are related to the acquisition environment. The cost premium for these Cost Areas is not driven by Industry's 32 guidelines or Government EVM reporting requirements; however, EVM is impacted.

- Changes to Contract Funding
- Baseline by Funding
- Delay in Negotiations
- Volume of Changes
- Multiple CLINs
- Tracking MR by CLIN
- Embedding CLINs in WBS
- CLIN Volume
- Changes to Phasing of Contract Funding
- Incremental Funding
- Volatility that Drives Planning Changes

With respect to EVMS-associated efficiencies that can be implemented subsequent to contract award, the Integrated Baseline Review (IBR) should take place as soon as practical after the performance measurement baseline is in place because it results in the assessment of whether the program is ready for execution. The contract clause may require an IBR within 60, 90 or 180 days of contract award. Within the bounds of the requirements, and based on technical requirements, conducting an IBR promptly can lead to effective EVM implementation. Contracts with major subcontractors may need longer preparation time

before the IBR, because IBRs at the subcontract level must be conducted first. Programs can experience corrosive effects if the IBR is too soon or too late. Avoid a one-size-fits-all policy.

In the absence of mature technical requirements, the contractor's EVMS implementation should put more emphasis on scope definition and work authorization, with clearly defined assumptions which adequately bound the authorized work, in order to minimize the risk of unfavorable performance and cost growth. This will result in timely insight into performance problems and cost growth, so that management can respond with corrective or preventative actions.

Align the IBR objectives to be reflective of the acquisition strategy risks pre- and post- award, to assess the contractor's ability to deliver mission capabilities within cost, schedule and performance targets.

Table 7 provides a list of suggested actions for specific stakeholders pertaining to *Theme 2 – Recommendation 3* (*Align the IBR objectives to focus on the risk, pre- and post- award to assess the contractor's ability to deliver mission capabilities within cost, schedule and performance targets*).

Table 7 – Theme 2 Recommendation 3 Stakeholders and Suggested Actions

Theme 2 Recommendation 3: Align the IBR objectives to focus on the risk, pre- and post- award to assess the contractor's ability to deliver mission capabilities within cost, schedule and performance targets.	
Stakeholder	**Suggested Action**
Government PM	Ensure IBRs are used to review as much scope as viable at a detailed level, so as to avoid excessive number of reviews. Use planning packages for far term work. Use a closed loop closure plan to deal with IBR follow-up actions. Consider and plan the timing of the IBR, jointly with the Contractor PM.
Contractor PM	Consider and plan the optimal timing of the IBR, jointly with the Government PM.
PARCA	Update OSD IBR guidance and training to focus on risk and ensure IBR does not turn into a compliance/surveillance review.

2.3 *Theme 3:* Volume of IBRs and compliance/surveillance reviews and inconsistent interpretation of the 32 EIA 748 Guidelines impacts the cost of EVM

An EVM Expert Working Group reviewed the survey responses of high or medium impacts to identify potential linkages between the Cost Areas that support the theme. *Figure 23* identifies the High-Medium Index for each of the Cost Areas identified by the working group for *Theme* 3[11].

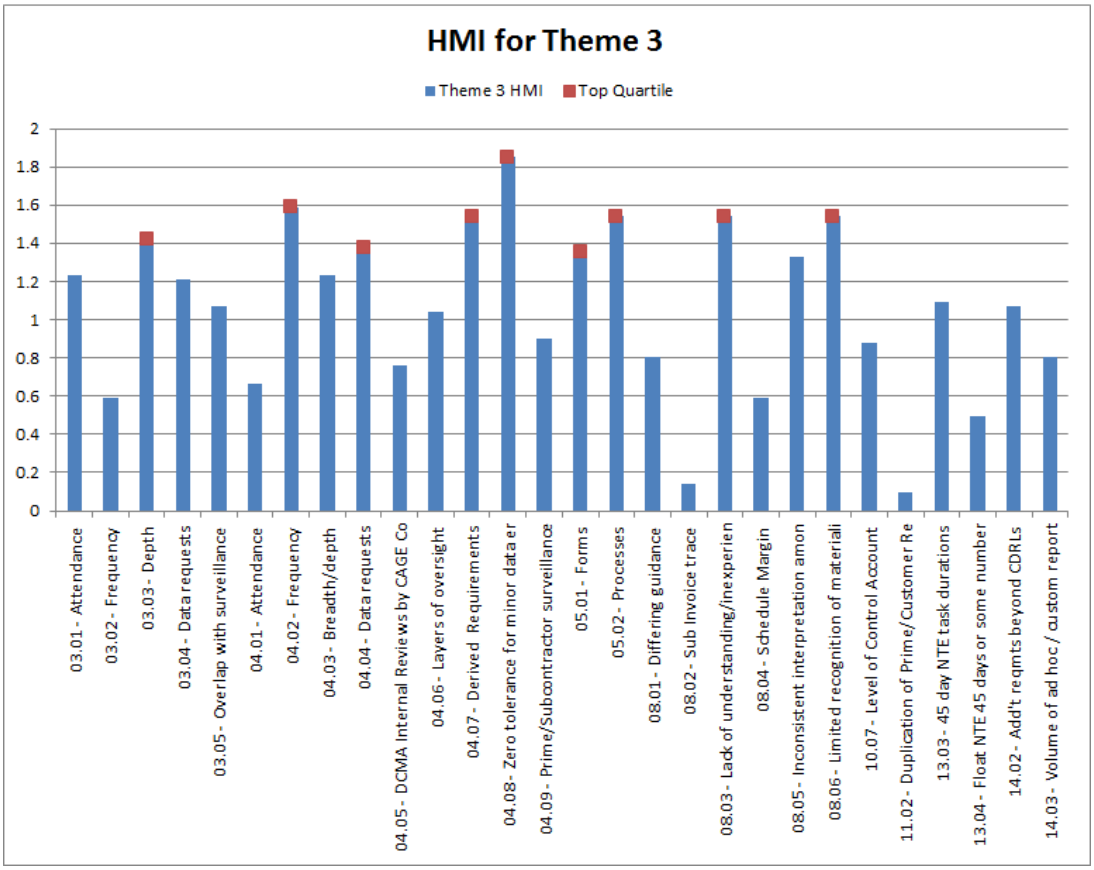

Figure 23 – High-Medium Index (HMI) for Theme 3

- ***Survey comments from Industry supporting Theme 3 include IBR and Compliance/Surveillance Topics:***

  IBR Comments

  - *Volume of IBR reviewers drives data production, prep time, pre-review, etc…*
  - *Delta IBRs are process oriented*

[11] *Theme 3 Cost Area data refers to ALL types of reviews (IBRs, compliance and surveillance) and to the multiple stakeholders involved in inconsistent guideline interpretation to include Government program management, Government oversight, prime contract process owner and oversight, and subcontractor process owner and oversight*

Compliance/Surveillance Comments

- *Zero tolerance for minor data errors*
- *Depending on who is conducting the review different interpretations of the standards are made and CARs can be written in one review but are not an issue in the other.*
- *We overachieve the level required to meet the EIA requirement, in order to avoid the outside chance that a CAR will be issued.*

Theme 3 includes 28 Cost Areas. 28% of all reported impacts for this theme are High or Medium (*Figure 24*). Consolidated Oversight is the major High/Medium stakeholder for the theme with 51% of all High and Medium Impacts (*Figure 25*).

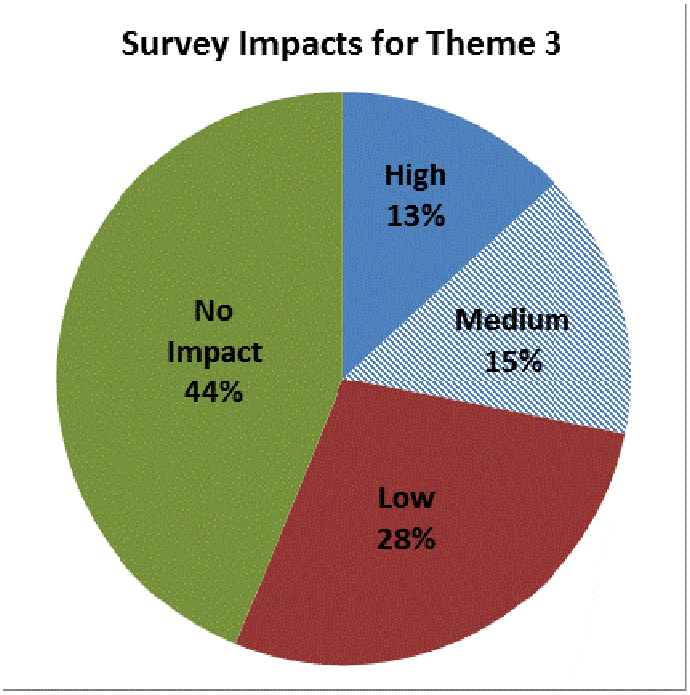

Figure 24 – Survey Impacts for Theme 3

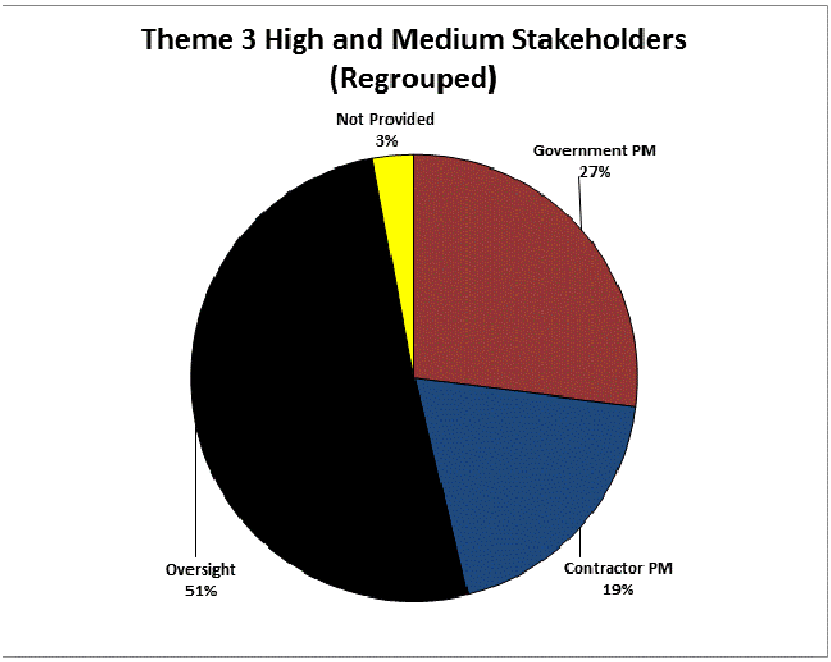

Figure 25 – Theme 3 High and Medium Stakeholders

Raw stakeholder impact values for *Theme 3* are available in *Figure 26*. *Figure 27* identifies the High and Medium Impacts for *Theme 3.*

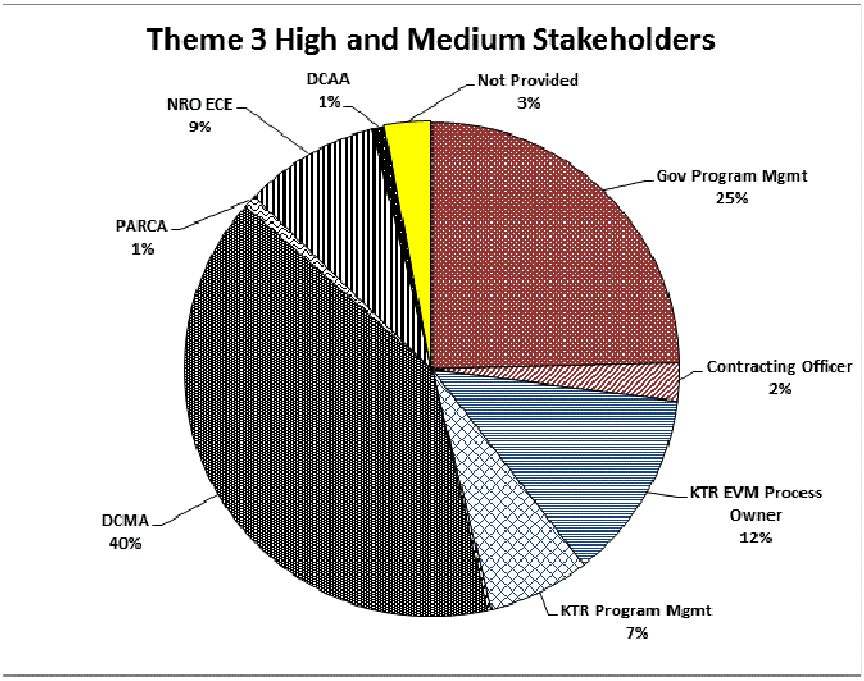

Figure 26 – Theme 3 High and Medium Stakeholders (Regrouped)

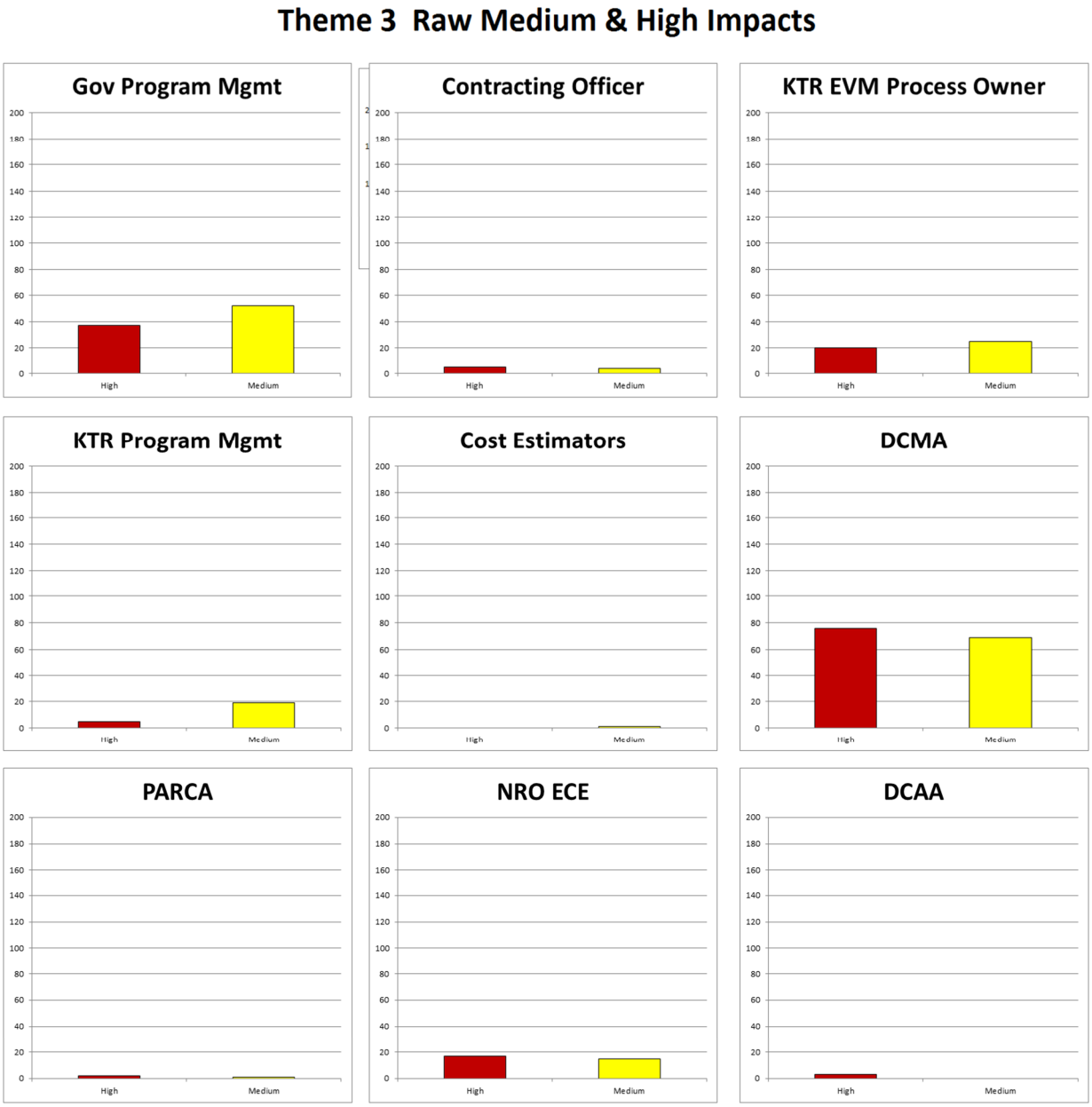

Figure 27 – Raw High and Medium Impact Numbers listed by Stakeholder for Theme 3

The JSCC EVM working group that met in March 2014 reviewed the survey data and developed the following points based on review of the survey results and proposed themes:

- Number of guidelines reviewed, and (breadth and depth) can impact the cost of reviews
- Sometimes there are typos on documentation such as WADs. During surveillance, DCMA issues CARs for errors such as typos, and that causes a cost impact to a program to work the CAR to resolution.
- Sometimes there is not a cost-benefit analysis; approach is not proportional to the risk

- Contractors are sensitive to overlapping scope, duplication, and timing of internal surveillance, joint surveillance (DCMA), DCAA Audits and IBRs. This can be compounded by other reviews (regulatory, such as Sarbanes-Oxley Compliance).
- Government personnel conducting surveillance have, at times, requested excessive data, requiring contractor preparation time, for surveillance reviews.
- Minor errors have been incorrectly identified as major issues (e.g., one out of 1,000 records, or a signature performed at 34 days instead of 30, etc.). These can be noted and fixed without requiring either a Corrective Action Plan (CAP) or root cause analysis.
- Other related issues include better definitions of materiality and assessment of EIA guidelines in a risk-based model.
- Consider better ways to assess CAR types, for instance:
    - 9/10 CAMS do not have adequate work authorizations = Major Implementation CAR
    - 3/10 CAMs = Discipline CAR
    - 1/10 CAMs = Administrative CAR

The full JSCC discussed *Theme 3*, and made the following comments and observations

- **The materiality of a review finding may have an impact in how it is perceived in terms of impact to the cost of EVMS**. If a finding is perceived as material, fixing it should not be considered to be a cost impact. If a finding is perceived as immaterial, fixing it may be considered a cost impact, above what would be done for EVM on an internal or fixed price program.

DOD is codifying guidance for the foundation of EVM compliance with the EIA 748 guidelines as it drafts the *DoD EVMS Interpretation Guide*. This guide will help identify opportunities for increased consistency across oversight.

Industry is working on piloting fact-based, data driven reviews with DCMA. This effort employs an automated tool to assess data validity, to determine scope and frequency of reviews, sometimes referred to as the “Turbo Tax” analogy. Frequency and scope are based on agreed-to criteria by Government and Industry. The challenge with this approach is that it only deals with the data validity elements of compliance. It does not consider the system description or management processes. However it does provide a mechanism to hone in on trouble areas.

The JSCC is very interested in the data driven approach but needs to review the pilot results before recommending how to apply this concept.

Recognizing that this theme contains Cost Areas related to IBRs and Compliance/Surveillance Reviews, the recommendations are separated into IBR and Compliance/Surveillance categories below. It is important to note that only one Cost Area specific to IBRs was identified as a top quartile cost impact.

2.3.1 Theme 3 Recommendation 1: Data requests for Surveillance reviews should focus on the standard artifacts/outputs of the compliant EVMS

In order to conduct reviews, Government program management and Government oversight make data requests, and the contractor provides data. Advance preparation ensures better use of time at reviews. Survey results indicate that some of these data requests have an impact on the cost of EVM.

In limited cases, contractors and Government oversight agencies are moving from "push" to "pull" data transmission. "Push" means that the Government submits a data request, and the contractor provides the items on the list. "Pull" means that the contractor regularly posts standard items in a repository, and the Government retrieves them as needed. Where the "pull" data transmission has been successful, programs found that it reduces the amount of interaction required and Government review preparation time. Having the data in advance allows oversight to conduct a targeted review.

When Government requests for data are coupled with reasons for the request, Industry has a chance to provide recommendations for how the data (or alternative acceptable information) can be provided in native form, minimizing the data gathering and dissemination cost.

Table 8 provides a list of suggested actions for specific stakeholders pertaining to *Theme 3 – Recommendation 1* (*Data requests for Surveillance reviews should focus on the standard artifacts/outputs of the compliant EVMS*).

Table 8 – Theme 3 Recommendation 1 Stakeholders and Suggested Actions

Theme 3 Recommendation 1: Data requests for Surveillance reviews should focus on the standard artifacts/outputs of the compliant EVMS	
Stakeholder	**Suggested Action**
Government Oversight	Consider artifacts required by the contractor's EVM System Description when making data requests (so there is an understanding of the relative cost impact of data requests). Provide better communication with more transparency as to how systems are evaluated (*DoD EVMS Interpretation Guide*), i.e. what information is required versus an artifact list.
Contractor EVMS Process Owner	Include an explicit list of standard outputs of the EVMS in the EVM System Description (for a validated system).

2.3.2 Theme 3 Recommendation 2: Data requests for IBRs should focus on standard artifacts/output that support mutual understanding of the executibility of the PMB

While there is much overlap in data artifacts/outputs required for both IBR and Surveillance reviews, additional data (non-EVM) is required to achieve situational awareness for completion of a successful risk review for the IBR.

When Government requests for data are coupled with reasons for the request, Industry has a chance to provide recommendations for how the data, or a suitable alternative, can be provided in native form, minimizing the data gathering cost.

Table 9 provides a list of suggested actions for specific stakeholders pertaining to *Theme 3 – Recommendation 2* (*Data requests for IBRs should focus on standard artifacts/output that support mutual understanding of the executibility of the PMB*).

Table 9 – Theme 3 Recommendation 2 Stakeholders and Suggested Actions

Theme 3 Recommendation 2: Data requests for IBRs should focus on standard artifacts/output that support mutual understanding of the executibility of the PMB	
Stakeholder	**Suggested Action**
Government PM	Consider artifacts required by the contractor's EVM System Description when making data requests (so there is an understanding of the relative cost impact of data requests).
KTR Process Owner	(KTR Process Owner Action) Include an explicit list of standard outputs of the EVMS in the EVM System Description (for a validated system).

2.3.3 Theme 3 Recommendation 3: The IBR should not replicate the surveillance review

When communicating objectives and success criteria for the IBR, the Government and contractor program management teams need to focus on reviewing the performance measurement baseline, including cost, schedule and technical risk. While there may be overlap in terms of the EVMS topical areas (CAP, Quantifiable Backup Data, WAD, WBS Dictionary, SOW, Organizational Chart, Schedule, Critical Path, Schedule Risk Assessment) discussed during an IBR and surveillance reviews, the IBR should not focus on the guideline compliance for an EVMS, unless warranted as a high risk to program success.

Table 10 provides a list of suggested actions for specific stakeholders pertaining to *Theme 3 – Recommendation 3* (*The IBR should not replicate the surveillance review*).

Table 10 – Theme 3 Recommendation 3 Stakeholders and Suggested Actions

Theme 3 Recommendation 3: The IBR should not replicate the surveillance review	
Stakeholder	**Suggested Action**
NDIA	Review and update IBR Guidance to emphasize the focus on baseline achievability and risks, and minimize the management process aspects. (NDIA IBR Guide).
Government Oversight	Review and update IBR Guidance to emphasize to focus on baseline achievability and risks, and minimize the management process aspects. (OSD IBR Guide, NRO IBR Handbook, etc.).
JSCC	Even though the source documentation reviewed at the IBR and surveillance reviews may be the same, the IBR focus and questions should be expressly different from the focus and questions at a surveillance review. Identify distinct IBR versus surveillance review focus and example questions for common artifacts supporting the review objectives JSCC will provide recommendations to OUSD AT&L, DoD Functional IPTs, NDIA/IPMD.

2.3.4 Theme 3 Recommendation 4: Establish a consistent definition within each organization of severity and the remediation required to address a compliance or surveillance finding

Each oversight organization, based on acquisition authority, should ensure a consistent approach for evaluating compliance and conducting surveillance of a contractor's EVMS. Oversight organizations may define severity differently, but if each organization consistently applies and communicates the parameters of its own definition, it can be understood and appropriately and efficiently addressed by Industry.

DCMA is developing a data driven approach to review planning and preparation that is designed to increase consistency across reviews. The analysis will identify problems or anomalies (e.g. emerging "Turbo Tax" style data assessment tool, DCMA 14 point analysis, CPI/TCPI analysis). DCMA is still developing criteria for how to handle out-of-threshold anomalies.

The JSCC survey identified instances where Industry believes the cost of remediation exceeds the benefit derived from the fix.

During a program acquisition, while the Government and Contractor share the goal of acquiring mission capabilities, both parties have different organizational responsibilities and interests (public trust, business interests). Therefore, at times there may be instances where these interests may cause an adversarial relationship following a compliance/surveillance review. As a result, it is incumbent on the parties to find a constructive path to resolution of the issues. Timely and effective communication is critical for the constructive dialogue to resolve issues.

While the DFARS has a definition of what comprises a significant EVMS deficiency, the overall topic of materiality and communicating the impacts of severity is a nuanced issue. To merely scratch the surface of

simply defining “severity” may not alone fully address the original concerns addressed in the survey and the subsequent survey analysis. During the JSCC Study SME Working Group November 2014 meeting, numerous issues were discussed that represent challenges with resolving concerns for defining EVMS deficiency severity and materiality (*Table 11*).

Table 11 – EVMS Deficiency Severity and Materiality

Item	Contributing Factors & Challenges for Defining Materiality	Stakeholder With Recommended Action		
		Industry	Govt.	Both
1	The application of the DFARS Business System rule & withholds has politicized & polarized the subject of materiality between Industry and DoD.			X
2	Mission & program advocacy can influence or eclipse the relevance of independent non-advocate review results.			X
3	While there may be an appearance that each stakeholder understands the meaning of compliance, the understanding might not be consistent or universal.			X
4	The aging of Tri-service era EVMS validations (30-40 years) and the expectation that “once validated, forever validated” has challenged any discussion of materiality. The concept of compliance is not well understood by all parties.			X
5	The DCMA strategy for defining system validation (advance agreements, business system rule for approvals and disapprovals) following the elimination of Advance Agreements has added to the confusion of materiality without an update to the DFARS and related guidance.			X
6	Industry is concerned that the cost of remediation exceeds the benefits derived from resolution.		X	
7	Industry is concerned that different organizations have different approaches for defining materiality.		X	
8	Unsubstantiated claims for the potential risk of excessive cost growth by Industry Partners following reviews can obfuscate the relevance of independent review results.	X		
9	Independent surveillance organizations may not have adequate “top cover” to perform independent reviews without fear of reprisal or unfavorable job performance, (if CARs are written or personnel are associated with Government-written CARs).	X		

Table 12 provides a list of suggested actions for specific stakeholders pertaining to *Theme 3 – Recommendation 4* (*Establish a consistent definition within each organization of severity and the remediation required to address compliance or surveillance finding*).

Table 12 – Theme 3 Recommendation 4 Stakeholders and Suggested Actions

Theme 3 Recommendation 4: Establish a consistent definition within each organization of severity and the remediation required to address a compliance or surveillance finding	
Stakeholder	**Suggested Action**
Government Oversight (DCMA)	Provide overview of CAR/CAP Process to NDIA in support of the severity and materiality For significant deficiencies, relate how materiality is compared against the initial compliance determination of legacy EVMS validations. Relate how materiality is compared against the initial compliance determination Provide overview of how this process relates materiality to the DFARS Business System Rule.
PARCA	Meet with DPAP to discuss the impacts of the Business Systems Rule on the Buyer/Supplier relationship related to EVMS. Ensure OSD senior leadership is aware of challenges associated with program advocates' accountability for understanding review findings without undermining or challenging the integrity of independent reviewers. Ensure that appropriate FIPTs provide sufficient training for stakeholders to properly understand materiality. Identify opportunities for DAU to support DCMA's training needs. For significant deficiencies, coordinate how materiality is compared against the initial compliance determination of legacy EVMS validations.
JSCC	Compare and contrast DCMA CAR/CAP Process (ECE/DCMA). Continue to coordinate with oversight organizations to evaluate data driven approach, with the goal of increasing objectivity and consistency across program reviews.
NDIA	Define severity for internal surveillance. Define Industry's view and position on materiality and severity for industry's internal company surveillance organizations. Update EVMS Surveillance Guide to ensure adequate guidance is provided to Industry's independent surveillance organizations. Ensure NDIA Guides include information to Industry senior leadership for holding program advocates accountable for understanding review findings without undermining or challenging the integrity of independent reviewers. Ensure that NDIA guides include information to Industry for what comprises independence within an organization which supports an effective surveillance program.
ECE	Provide overview of CAR/CAP Process to NDIA in support of the severity and materiality For significant deficiencies, relate how materiality is compared against the initial compliance determination of legacy EVMS validations. Relate how materiality is compared against the initial compliance determination

2.3.5 Theme 3 Recommendation 5: Adopt a risk-based approach to scheduling surveillance reviews, minimizing reviews by timeframe and site

DCMA initiated the approach of performing multiple surveillance reviews at a Contractor site with each addressing different guidelines for cost savings. Industry feedback suggests that it is less efficient to have multiple reviews in a given year on one program. The approach of multiple reviews takes additional time from each program office, as well as each CAM involved. Since the 32 Guidelines are interrelated, reviews should not deal with each guideline in isolation. Combining the reviews may result in a single 3-4 day review, rather than monthly visits from DCMA teams. Other factors of determining review frequency and breadth should include process risk (previous deficiencies) and size and/or remaining work of program.

Table 13 provides a list of suggested actions for specific stakeholders pertaining to *Theme 3 – Recommendation 5* (*Adopt a risk-based approach to scheduling surveillance reviews, minimizing reviews by timeframe and site*).

Table 13 – Theme 3 Recommendation 5 Stakeholders and Suggested Actions

Theme 3 Recommendation 5: Adopt a risk-based approach to scheduling surveillance reviews, minimizing reviews by timeframe and site	
Stakeholder	**Suggested Action**
Government Oversight (DCMA)	Scale the review schedule to the program risk, cognizant of program type, supply chain impact, program management concerns with data.

2.3.6 Theme 3 Recommendation 6: Reduce inconsistent interpretation of EVMS implementation

The survey identified inconsistent interpretation of EVM implementation and practices, for example:

- Different interpretations across multiple DCMA auditors
- Company process owners over-implementing processes to avoid a CAR

Inconsistent EVMS guidance and interpretation can be mitigated by better communication of expectations between: company program management and company process owner; Government and Industry; and, Government program management and Government oversight.

Sometimes, inconsistencies can occur within a company's own EVMS. Contractors may end up with an inefficient system due to patches and actions done to resolve CARs without a systematic end-to-end review.

Table 14 provides a list of suggested actions for specific stakeholders pertaining to *Theme 3 – Recommendation 6* (*Reduce inconsistent interpretation of EVMS guidelines*).

Table 14 – Theme 3 Recommendation 6 Stakeholders and Suggested Actions

Theme 3 Recommendation 6: Reduce inconsistent Interpretation of EVMS implementation	
Stakeholder	**Suggested Action**
Government Oversight (DCMA)	Develop process for escalation through functional specialist chain for adjudication of any identified discrepancies. Continue implementing the data-driven approach to surveillance reviews and provide feedback to the acquisition community.
PARCA	Develop *DoD EVMS Interpretation Guide* to set the parameters of EVMS compliance.
Contractor Process Owner	Establish periodic review of processes and work products which may be duplicative or not well integrated.

Appendix A – Suggested Implementing Guidance/References

Table 15 – Suggested Tools and Materials

The following table identifies guidance and references that could be updated to implement the recommendations.

JSCC Recommendations	Doc Ref #	DoD Program Execution Guide	DoD Guide to IBRs	IMP EVM Guide	IPMR Handbook	DFARS update (para #)	FIPT Input	DCMA updates	ECE updates	Industry updates (NDIA guides)	Company updates (PM or SD documents)	RFP Guidance and RFP Templates
Ensure WBS, Control Accounts and Reporting Levels are appropriate for the contract type, scope, risk and value	2.1.1	X	X	X	X	X	X			X	X	X
Define a product oriented WBS and do not allow it to be replicated by CLIN or other reporting needs	2.1.2	X	X				X				X	X
Include EVM expertise in RFP and Proposal Review panels and processes	2.1.3	X	X					X			X	X
Re-evaluate management structure and reporting levels periodically to optimize EVM reporting levels commensurate with program execution risk	2.1.4	X									X	
Scale the EVM/EVMS Implementation (depth) to the Program based on program size, complexity and risk. EVMS includes people, processes and tools.	2.2.1	X									X	
Plan the authorized work to an appropriate level of detail and time horizon, not just the funded work	2.2.2	X	X								X	
Align the IBR objectives to focus on the risk, pre- and post-award to assess the contractor's ability to deliver mission capabilities within cost, schedule and performance targets	2.2.3	X	X	X			X				X	
Data requests for Surveillance reviews should focus on the standard artifacts/outputs of the compliant EVMS	2.3.1							X	X	X	X	
Data requests for IBRs should focus on standard artifacts/output that support mutual understanding of the executibility of the PMB	2.3.2		X									
The IBR should not replicate the surveillance review	2.3.3		X				X				X	
Establish a consistent definition within each organization of severity and the remediation required to address a finding	2.3.4							X	X	X	X	
Adopt a risk-based approach to scheduling surveillance reviews, minimizing reviews by timeframe and site	2.3.5							X	X	X	X	
Reduce inconsistent interpretation of EVMS guidelines	2.3.6							X	X	X	X	

FIPT – Functional Integrated Product Team, Defense Acquisition University's working group to plan and monitor EVM Training

DoD Program Execution Guide is a planned replacement for sections of the Earned Value Management Implementation Guide (EVMIG)

Appendix B – Survey Cost Drivers and Cost Areas

The JSCC Better EVM Implementation Survey was organized by 15 Cost Drivers and 78 Cost Areas (*Figure 28*). Survey respondents identified High, Medium, Low and No Impact at the Cost Area level.

1. Variance Analysis
01.01 Reporting Variance at Too Low a Level of the WBS
01.02 Volume - Lack of Meaningful Thresholds
01.03 Frequency of Variance Analysis Reporting
01.04 Number of Approvals Before Submitting Variance Analysis
01.05 Developing Corrective Actions
01.06 Tracking Corrective Actions
2. Level of Control Account
02.01 Plan
02.02 Analyze
02.03 Report
02.04 Volume of Corrective Actions
3. Integrated Baseline Reviews
03.01 Attendance
03.02 Frequency
03.03 Depth
03.04 Data Requests
03.05 Overlap with Surveillance
4. Surveillance Reviews
04.01 Attendance
04.02 Frequency
04.03 Breadth/Depth
04.04 Data Requests
04.05 Dcma Internal Reviews by Cage Code
04.06 Layers of Oversight
04.07 Derived Requirements
04.08 Zero Tolerance for Minor Data Errors
04.09 Prime/Subcontractor Surveillance
5. Maintaining EVM System
05.01 Forms
05.02 Processes

6. WBS
06.01 Level
06.02 Recurring/Non-Recurring
06.03 Clin Structure Embedded
06.04 Non-Conforming
06.05 Conforming
06.07 Unique Customer Driven Requirements
7. Documentation Requirements
07.01 Interim WADs
07.02 IPMR/CPR/IMS
07.03 Logs
07.04 EAC/CEAC
07.05 Frequency of Reporting
07.06 Level of Detail
07.07 Accounting Reconciliation
07.08 Expectation that Every Doc Stands Alone Drives Redundancy
07.09 Overly Prescriptive
8. Interpretation Issues
08.01 Differing Guidance
08.02 Sub Invoice Trace
08.03 Lack of Understanding/Inexperienced Auditors
08.04 Schedule Margin
08.05 Inconsistent Interpretation Among Reviewers
08.06 Limited Recognition of Materiality / Significance of Issues
9. Tools
09.01 Inadequate EVM Tools
09.02 Cost Schedule Integration
09.03 Prime Sub Integration
09.04 Materials Mgmt Integration

10. Customer Directed Changes
10.01 Delta IBRs
10.02 Baseline Change/ Maintenance
10.03 Baseline Freeze Period
10.04 Changes to Phasing of Contract Funding
10.05 Baseline by Funding, not Budget
10.06 Poorly Definitized Scope
10.07 Level of Control Account
10.08 Delay in Negotiations
10.09 Volume of Change
11. Subcontractor EVMS Surveillance
11.01 Customer Involvement
11.02 Duplication of Prime/Customer Review
11.03 Supplier Cars Flow to Prime
12. CLINs Reporting
12.01 Multiple CLINs
12.02 Tracking MR
12.03 Embedding Clins in WBS
12.04 Separate Planning, Tracking & Reporting Reqmts
12.05 CLIN Volume
13. IMS
13.01 Integration of Subs
13.02 Volume of Tasks/Level of Detail
13.03 45 Day NTE Task Durations
13.04 Float NTE 45 Days or Some Number
14. Reporting Requirements
14.01 Tailoring
14.02 Add'T Reqmts Beyond CDRLs
14.03 Volume of Ad Hoc / Custom Reports
15. Funding/Contracts
15.01 Changes to Phasing of Contract Funding
15.02 Incremental
15.03 Volatility Drives Planning Changes

Figure 28 – Complete Breakout of JSCC Cost Areas and Cost Drivers

Appendix C – Summary Level Data

Appendix C provides the summary-level data from the JSCC Survey as of October 1, 2014. This is graphical representation of the data used to support analysis in this briefing. Appendix C includes the following charts:

- High-Medium Indices for all JSCC Cost Areas
- High and Medium Impact Stakeholders
- Stakeholder Breakout by JSCC Cost Driver
- High-Medium Indices for Survey Stakeholders (broken out by JSCC Cost Drivers)
- Dollar Values for Surveyed Programs

High-Medium Indices for all JSCC Cost Areas

Top Quartile High-Medium Indices are spread out amongst a number of Cost Drivers (*Figure 29*). Multiple Top Quartile Cost Areas are found in Surveillance Reviews (4 of 9), Maintaining EVM System (2 of 2), Interpretation Issues (3 of 6), Customer Directed Changes (3 of 9), CLINs Reporting (3 of 5), and Funding/Contracts (3 of 3).

Figure 29 – Complete Breakout of JSCC High-Medium Indices

High and Medium Impact Stakeholders

27% of all survey data points (944 of 3,588 responses) have identified a High to Medium cost premium to comply with Government EVM Standards (*Figure 30*).

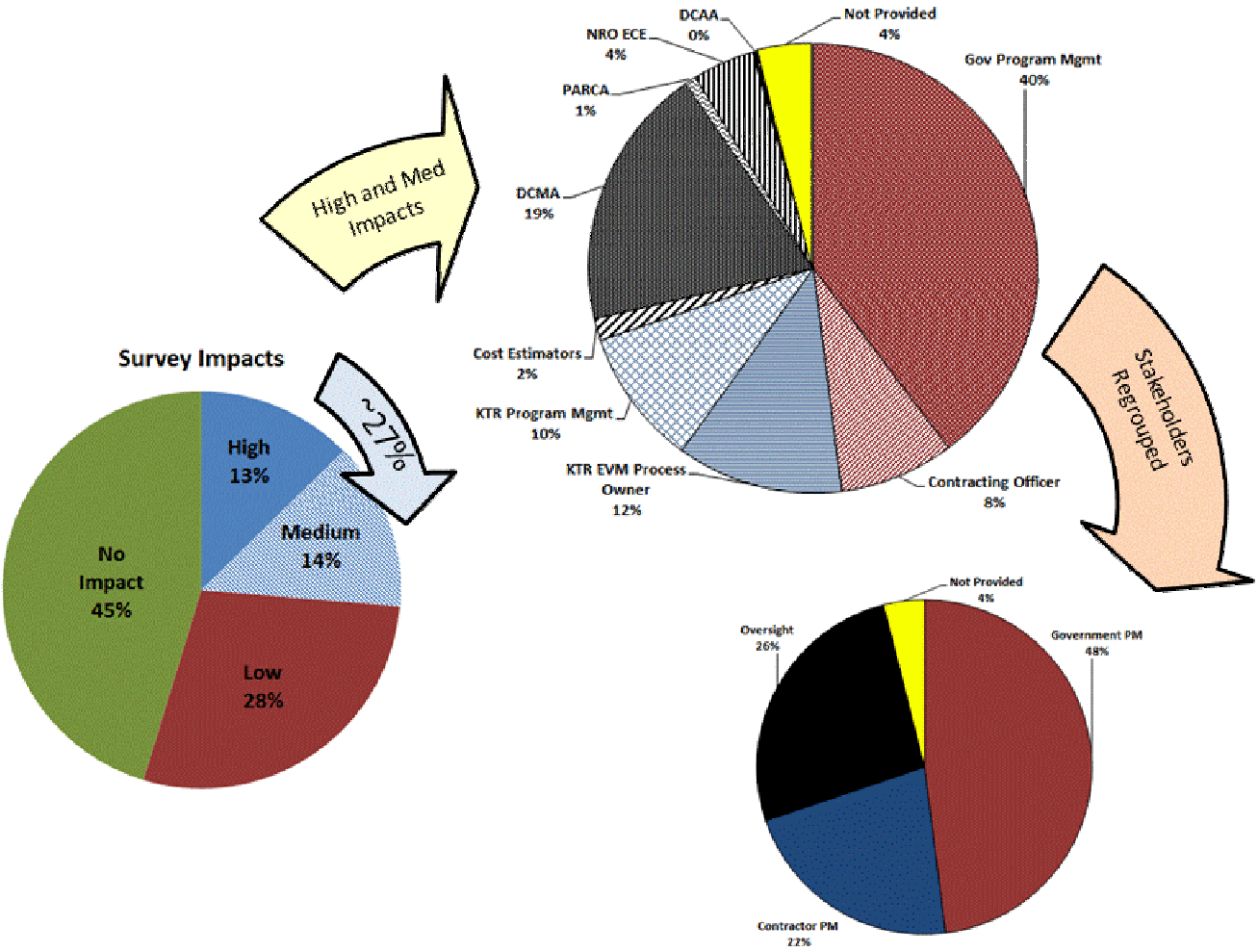

Figure 30 – High and Medium Impact Stakeholder Process Flow

Government Program Management is the primary stakeholder for 40% of the Medium and High Impacts, followed by DCMA with 19%. The only other significant stakeholders identified appear to be KTR (Contractor) EVM Process Owner (12%), KTR (Contractor) Program Management (10%), and Contracting Officer (8%).

Stakeholder Breakout by JSCC Cost Driver

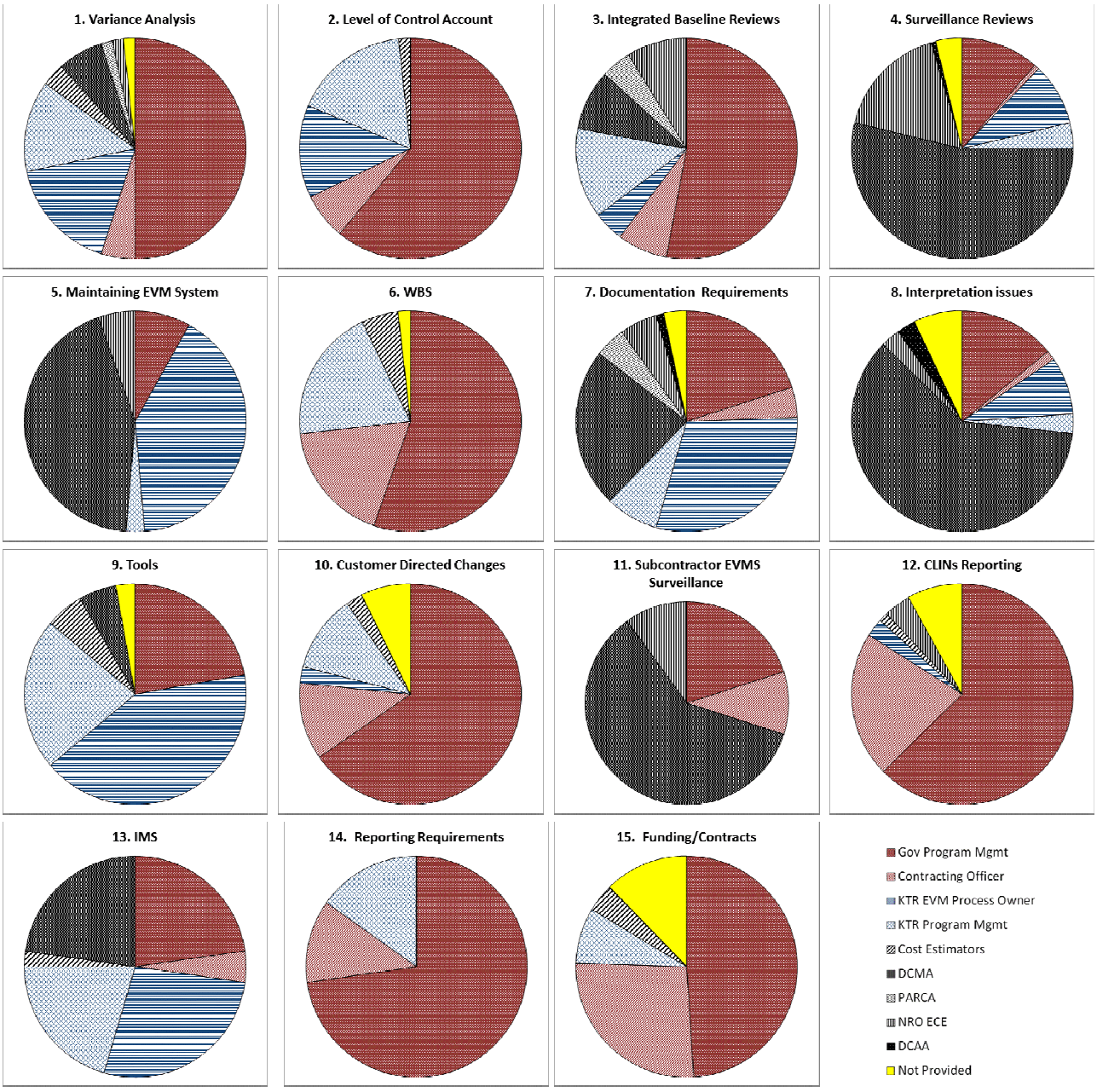

Figure 31 – Stakeholder Breakout by JSCC Cost Drivers

Government Program Management is a stakeholder that consistently cuts across all Cost Drivers (*Figure 31*) and is at least 50% of High-Medium Impacts for 8 of the 15 Cost Drivers.

High-Medium Indices for Survey Stakeholders (broken out by JSCC Cost Drivers)

Figure 32 – High-Medium Indices for Survey Stakeholders (broken out by JSCC Cost Drivers)

Figure 32 shows that a significant number of all Top Quartile High-Medium Indices are located in Government Program Management (12), KTR (Contractor) EVM Process Owner (7), DCMA (5), and Contracting Officer (4), and KTR (Contractor) Program Management (3).

Dollar Values for Surveyed Programs

Figure 33 provides an overview of the dollar values for each of the 46 programs used in the JSCC Study.

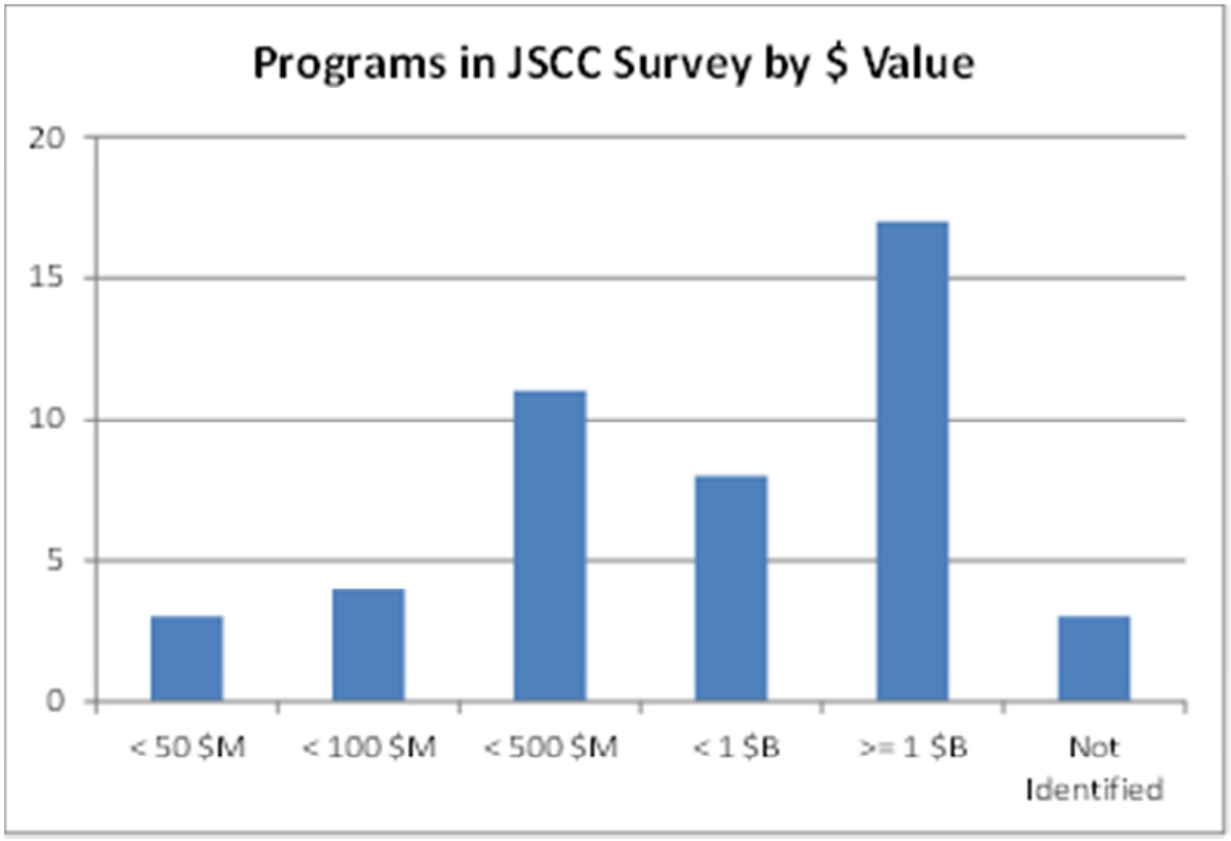

Figure 33 – Dollar Values for Surveyed Programs

Appendix D – Acronym List

- AFCAA - Air Force Cost Analysis Agency
- ANSI – American National Standards Institute
- AUW – Authorized Unpriced Work
- BCR – Baseline Change Request
- CA – Control Account
- CAGE Code – Contractor and Government Entity Code. Unique by contractor site
- CAM – Control Account Manager
- CAP – Corrective Action Plan
- CAR – Corrective Action Request
- CDRL – Contract Data Requirements List
- CLIN – Contract Line Item
- CPI – Cost Performance Index
- CWBS – Contract Work Breakdown Structure
- DAU – Defense Acquisition University
- DCAA – Defense Contract Audit Agency
- DCARC - Defense Cost and Resource Center
- DCMA – Defense Contract Management Agency
- DFARS – Defense Federal Regulation Supplement
- DID - Data Item Description
- DoD – Department of Defense
- DPAP – Defense Procurement and Acquisition Policy group
- EAC – Estimate at Complete
- ECE – Earned Value Management Center of Excellence
- ECP – Engineering Change Proposal
- ETC – Estimate to Complete
- EVMIG – Earned Value Management Implementation Guide
- EVMS – Earned Value Management System
- FIPT – Functional Integrated Product Team
- FFP – Firm Fixed Price
- IBR – Integrated Baseline Review

- IPMD – Integrated Program Management Division
- IPMR – Integrated Program Management Report
- IPT – Integrated Product Team
- ISR – Internal Surveillance Review
- JSCC – Joint Space Cost Council
- KTR – Contractor
- LOE – Level of Effort
- MR – Management Reserve
- NASA – National Aeronautics and Space Administration
- NDIA - National Defense Industrial Association
- NRO – National Reconnaissance Office
- NTE – Not To Exceed
- O&M – Operations and Maintenance
- OSD – Office of the Secretary of Defense
- PARCA – DoD Performance Assessments and Root Cause Analyses Group
- PCO – Procuring Contracting Officer
- PM – Program Management
- PMB – Performance Measurement Baseline
- RFP – Request for Proposal
- SMC - Space and Missile Systems Center
- SOW – Statement of Work
- SWBS – Standard Work Breakdown Structure
- TCPI – To Complete Performance Index
- UB – Undistributed Budget
- UCA – Undefinitized Contract Action
- VAR – Variance Analysis Report
- WAD – Work Authorization Document
- WBS – Work Breakdown Structure
- XML - Extensible Markup Language

Appendix E – Contributors

The JSCC sponsored this study, providing an effective forum for collaboration between Government and Industry in the Space Community. The JSCC Executive Secretary is Keith Robertson, National Reconnaissance Office. Industry Leads are Aerospace Industrial Association, Ball Aerospace, Boeing, Harris, Lockheed Martin, Northrop Grumman, Raytheon. Government Leads are Office of the Director of National Intelligence, National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, National Reconnaissance Office, Office of the Secretary of Defense/ Cost Assessment and Program Evaluation, US Air Force, US Air Force/Space and Missile Systems Center, and US Navy.

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